RECORD OF DECISION

EVR-Wood Treating/Evangeline Refining Company Superfund Site Acadia Parish, Louisiana

United States Environmental Protection Agency

Region 6

August 25, 2021

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FIGURES

TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
AGR	Agriculture
AST	Above Ground Storage Tank
bgs	below ground surface
BRAPF	Baseline Risk Assessment Problem Formulation
CCA	Chromated Copper Arsenate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
CSM	Conceptual Site Model
Dioxins	Polychlorinated Dibenzodioxins
ELCR	Excess Lifetime Cancer Risk
EMNR	Enhanced Monitored Natural Recovery
EPA	Environmental Protection Agency
FR	Federal Register
furans	Polychlorinated Dibenzofurans
FWP	Fish and Wildlife Propagation
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMW	High Molecular Weight
HQ	Hazard Quotient
IC	Institutional Control

IRIS	Integrated Risk Information System
LDEQ	Louisiana Department of Environmental Quality
LDR	Land Disposal Restrictions
LMW	Low Molecular Weight
MCL	Maximum Contaminant Level
mg/kg	Milligram per kilogram
MNR	Monitored Natural Recovery
NCP	National Contingency Plan
ng/kg	nanogram per kilogram
NPL	National Priority List
O&M	Operation and Maintenance
OWS	Oil Water Separator
PAH	Polycyclic Aromatic Hydrocarbon
PCP	Pentachlorophenol
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RECAP	Risk Evaluation/Corrective Action Program
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROW	Right-of-Way
SARA	Superfund Amendments and Reauthorization Act
S/S	Stabilization/Solidification
SCR	Secondary Contact Recreation
SLERA	Screening Level Ecological Risk Assessment
SSA	Sole Source Aquifer
SVOC	Semi-Volatile Organic Compound
TEQ	Toxicity Equivalent Quotient

ug/l	Micrograms per Liter
UST	Underground Storage Tank
VOC	Volatile Organic Compound

PART 1: THE DECLARATION

1.0 SITE NAME AND LOCATION

The Site is in a western unincorporated portion of Acadia Parish, Louisiana, approximately ½ mile northeast of Interstate 10 on Highway 97 (Old Evangeline Highway). The nearest major city is Jennings, Louisiana, which is southeast of the Site. The National Superfund Database Identification Number is LAN000605517.

2.0 STATEMENT OF BASIS AND PURPOSE

This decision document presents the "Selected Remedy" for the EVR-Wood Treating/Evangeline Refining Company Superfund Site (EVR-Wood) which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 United States Code §9601 et seq., as amended by the Superfund Amendments and Reauthorization Action of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300, as amended. This decision is based on the Administrative Record file for the Site.

The State of Louisiana, acting through the Louisiana Department of Environmental Quality (LDEQ), supports the selected remedy.

3.0 ASSESSMENT OF THE SITE

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment.

4.0 DESCRIPTION OF SELECTED REMEDY

The overall cleanup strategy for the EVR-Wood Site is to cap the contaminated old process areas as well as contaminated areas along the gas pipeline right-of-way in the western swamp area of the Site. The selected remedy already incorporates previous removal activities which removed the source materials constituting principal threats at the Site. The Selected Remedy is comprised of Alternative SED-8, Capping (Pipeline Right-of-Way Only) and Soil 4-1, Capping, which together along with Common Elements is estimated to cost a total of approximately $6,500,000. The components of this alternative are described in detail in Section 18.0 (Selected Remedy) of this ROD. Briefly, the major components of this alternative are:

- Contaminated swamp soil will be capped along the gas pipeline right-of-way where contaminant concentrations are highest.

- Strikes a balance between reducing exposure to swamp soil contamination and the destruction of the swamp habitat.

- Contaminated soils in the non-wetland areas will be capped, thus preventing exposure to both surface and subsurface soils.

- For both swamp area and non-wetland areas, a high-visibility geotextile fabric will be installed directly on the contaminated soils underneath the cap, to alert anyone that may excavate in these areas in the future.

- Loss of wetland habitat will be offset with the purchase of credits from a permitted wetlands mitigation bank, since new wetlands cannot be constructed on the Site without the loss of existing habitat.

- The reasonably anticipated future land use is commercial/industrial. Institutional Controls will be implemented to limit future land use to recreational use or commercial and industrial use, as appropriate.

- Structures and debris from the former wood-treating and refinery operations will be removed to ensure there are no residual sources of contaminants.

- Continuation of groundwater monitoring at the Site, to gather information to determine if further action is needed concerning groundwater, as well as to verify the remedial action is functioning as intended and not allowing releases to the groundwater.

5.0 STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost effective, and utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

The Selected Remedy also satisfies the statutory preference to use engineering controls for contaminated soils that pose a long-term threat by capping to reduce mobility. The Selected Remedy also satisfies the statutory preference for treatment with previous removal actions that removed the principal threat wastes located on-site.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted to ensure that the remedy is, or will be, protective of human health and the environment.

6.0 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this Site.

- Chemicals of concern and their respective concentrations (Sections 12.1 and 12.4)
- Baseline risk represented by the chemicals of concern (Section 14.0)
- Cleanup levels established for chemicals of concern and the basis for these levels (Sections 15.2 and 18.0)
- How source materials constituting principal threats are addressed (Sections 11.0, 17.1, and 18.0)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the Baseline Human Health Risk Assessment (Sections 12.1, 13.1, 13.2, and 15.1)
- Potential land and ground water use that will be available at the Site as a result of the Selected Remedy (Sections 18.0)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Sections 16.0)
- Key factor(s) that led to selecting the remedy (i.e. describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Sections 17.0 and 18.0)

7.0 AUTHORIZING SIGNATURES

This ROD documents the Selected Remedy for the EVR-Wood Treating/Evangeline Refining Company Superfund Site. This remedy was selected by the Environmental Protection Agency (EPA) with the concurrence of the LDEQ. The Director of the Superfund Division (EPA Region 6) has been delegated the authority to approve and sign this ROD.

U.S. Environmental Protection Agency (Region 6)

By:

WREN STENGER

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Wren Stenger — Date
Director, Superfund and Emergency Management Division

CONCURRENCE PAGE – RECORD OF DECISION

EVR-Wood Treating/Evangeline Refining Company Superfund Site

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PART 2: THE DECISION SUMMARY

8.0 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

The EVR-Wood Site is in Acadia Parish near the City of Jennings, Louisiana. (See Figure 1 – Site Location Map). The National Superfund Database Identification Number is LAN000605517. The EPA is the lead agency for conducting the Remedial Investigation/Feasibility Study (RI/FS) and preparing the Record of Decision (ROD). The LDEQ is the supporting agency for the ROD.

The EVR-Wood Site is in a western unincorporated portion of Acadia Parish, Louisiana, approximately ½ mile northeast of Interstate 10 on Highway 97 (Old Evangeline Highway). The Site covers approximately 200 acres.

EVR-Wood Treating Company operated a wood-treating facility preserving timber products (e.g., fence posts and lumber), on the Site from the 1940s into the 1980s. Wood preservatives used at EVR-Wood included pentachlorophenol (PCP) with diesel fuel and naphthalene as carrier fluids, chromated copper arsenate (CCA), with water as a carrier fluid, and creosote. Refinery processes on the Site during Evangeline Refining Company's operations began in the late 1930s and ceased in the early 1980s. Evangeline produced and periodically stored naphtha, fuel oil, diesel, kerosene, gasoline, jet fuel, and reduced crude at various times during its operational history. The tank farm associated with the refinery was used as a storage facility into the 1990s, following closure of the refinery. Historical documents indicate that hazardous waste material, including styrene and chlorinated solvents, were stored at the tank farm following the closure of the refinery. The Site is a combination of contaminant sources and releases from operations that occurred at these facilities. Historical records indicate that some areas were utilized by both wood-treatment and refinery operations. The Site layout is shown in Figure 2.

9.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section of the ROD provides the history of the Site and a brief discussion of the EPA's and the State's removal, remedial, and enforcement activities.

The "Proposed Rule" proposing the Site for inclusion on the National Priorities List (NPL) was published in the Federal Register (FR) on March 15, 2012 (77 FR 15344). The "Final Rule" adding the Site to the NPL was published in the FR on September 18, 2012 (77 FR 57495).

9.1 - History of Contamination

EVR-Wood Treating Company operated a wood-treating facility preserving timber products (e.g., fence posts and lumber), on the Site from the 1940s into the 1980s. Wood preservatives used at EVR-Wood included pentachlorophenol (PCP), with diesel fuel and naphthalene as carrier fluids, chromated copper arsenate (CCA), with water as a carrier fluid, and creosote. Refinery processes on the Site during Evangeline Refinery Company's operations began in the late 1930s and ceased in the early 1980s. Evangeline produced and periodically stored naphtha, fuel oil, diesel, kerosene, gasoline, jet fuel, and reduced crude at various times during its operational history. The tank farm

associated with the refinery was used as a storage facility into the 1990s, following closure of the refinery. Historical documents indicate that hazardous waste material, including styrene and chlorinated solvents, were stored at the tank farm, following the closure of the refinery. The Site is a combination of contaminant sources and releases from operations that occurred at these facilities. Historical records indicate that some areas were utilized by both wood-treatment and refinery operations.

By the time the Site was listed on the National Priorities List (NPL) on September 19, 2012, most of the structural facilities associated with the former Site operations had been removed through previous removal actions. Remaining features on-site included the former EVR-Wood Office (currently being used as a residence), the former Evangeline Office (currently vacant), a storage shed adjacent to the former EVR-Wood Office, the former cooling pond, several pits, debris piles, an above ground storage tank (AST), underground storage tank (UST), and oil/water separator (OWS).

9.2 – Site Activities

Investigations

Multiple investigations have been performed at the Site since the 1980's. These historical investigations are listed below:

EVR-Wood Treating Company
• Identification and Preliminary Assessment (1984)
• Site Inspection (1984)
• Phase 1 Site Assessment (1992)
• Superfund Site Strategy Recommendation (1994)
• Phase 1 Site Assessment (1999)
• Phase 2 Site Assessment (2000)
• Expanded Site Inspection Report (2000)
• Removal Assessment (2000)
• Site Reassessment (2012).

Evangeline Refining Company
• Identification and Preliminary Assessment (1984)
• Site Inspection (1984)
• Sampling Effort (1985)
• General Inspection (1987)
• Tank Closure Plan (1989)
• Expanded Site Inspection Report (2000)
• Phase 1 Preliminary Evaluation Assessment (2004)
• Hazardous waste storage facility delisting inspection (2004)
• Site Reassessment (2012).

In January 2012, Louisiana Governor Bobby Jindal provided State concurrence to list the Site on the National Priorities List (NPL).

In February 2012, LDEQ wrote a memorandum stating that the wetlands at the Site were consistent with wetlands as defined in 40 CFR §230.3.

In March 2012, EPA produced a Hazard Ranking System Documentation Record. The report documented source material in the surface impoundments, in contaminated soil, and in the UST. Surface water migration pathways were also documented to be of concern.

In September 2012, the Site was added to the NPL.

Following site listing on the NPL, the EPA, in conjunction with LDEQ, performed additional site investigations.

• Remedial Investigation/Feasibility Study - Phase 1
- *Conceptual Site Model Technical Memorandum* (2013)
- *Sampling and Analysis Plan* (2013)
- *Health and Safety Plan* (2012)
• Remedial Investigation/Feasibility Study - Phase 2
- *Health and Safety Plan* (2014)
- *Site Management Plan* (2014)
- *Health and Safety Plan Addendum* (2015)
- Installation, development, and aquifer tests of monitoring wells
- Collection of surface soil, subsurface soil, and ground water samples
- *Phase 2 Data Evaluation Summary Report* (2016)
- *Phase 2 Remedial Investigation Report* (2016)
• Remedial Investigation/Feasibility Study - Phase 3
- *Health and Safety Plan* (2015)
- Collection of surface water, sediment, soil, waste materials, and ground water samples
- *Phase 3 Data Evaluation Summary Report* (2016)
- *Phase 3 Remedial Investigation Report* (2016)
- *Data Gap Evaluation Report* (2016)
- *Sampling and Analysis Plan, Data Gap Addendum* (2016)
- Collection of surface water, sediment, soil, ground water, crayfish, and fish
- *Phase 3 Data Gap Data Evaluation Summary Report* (2017)
- *Human Health Risk Assessment* (2017)
- *Screening Level Ecological Risk Assessment* (2017)
- *Comprehensive Remedial Investigation Report* (2017)
- *Feasibility Study* (2020)

9.3 Removal Actions

The EPA removed hazardous constituents (i.e., arsenic, polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzodioxins (dioxins) and polychlorinated dibenzofurans (furans) from the yard surrounding the former EVR-Wood Office, in the fall of 2018. 1,025 tons of contaminated soil was disposed in a Subtitle C Landfill operated by U.S. Ecology in Robstown, Texas. 236 tons of

contaminated soil was incinerated at the Veolia ES Tech Solutions facility located in Port Arthur, Texas.

An above ground storage tank (AST), underground storage tank (UST), and oil/water separator (OWS) associated with the wood treating operations containing hazardous substances remained on-site until they were removed during an EPA removal action, completed in the spring of 2019. A total of 58,310 pounds or 7,773 gallons of contaminated liquids were incinerated at the Clean Harbors Deer Park facility located in LaPorte, Texas. A total of 291,612 pounds of contaminated sludge was incinerated at the Clean Harbors El Dorado facility in El Dorado, Arkansas, or at the Clean Harbors Deer Park facility located in LaPorte, Texas.

9.4 Enforcement Activities

CERCLA 104(e) Information Request and General Notice Letters were sent to two Potentially Responsible Parties (PRPs) that were identified at the Site on August 6, 2013. Based on the PRPs' responses to the Information Requests, corporate statuses, and enforcement investigation, the EPA had concluded that the PRPs were unlikely to fund remedial activities at the Site.

10.0 COMMUNITY PARTICIPATION

The 2017 Remedial Investigation Report, the 2020 Feasibility Study, and the 2021 Proposed Plan for the EVR-Wood Site were made available to the public in May 2021. These, as well as other relevant Site documents, can be found in the Administrative Record for the Proposed Plan and were placed in the information repositories maintained at the Carnegie Public Library, the LDEQ Baton Rouge office, the EPA Region 6 office, and on the Site's web page. The notice of availability of the above documents was published in the Jennings Daily News on May 12, 2021. A public comment period was held from May 24, 2021, to June 23, 2021. A virtual public meeting was held on May 27, 2021, to present the Proposed Plan to the local community. At this meeting, representatives from EPA and LDEQ accepted comments and questions about the Site and the remedial alternatives outlined in the Proposed Plan. The EPA and LDEQ's responses to the comments received during the public comment period for the Proposed Plan are included in the Responsiveness Summary (Part 3), which is part of this ROD.

11.0 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The principal threat wastes at the Site, contained in the AST, UST, and the OWS, have been addressed by the removal that occurred in the Spring of 2019. In addition, potential exposure to contaminants found in the yard surrounding the former EVR-Wood Office has been addressed by the removal action in the fall of 2018.

The EPA will address the action for the EVR-Wood Treating/Evangeline Refining Company Site as one operable unit. This action will address soils and sediments with engineering controls to reduce the risk to adolescent recreational users, commercial workers, and construction workers. While the use of treatment to address the threats posed by the Site was considered, alternatives utilizing

treatment will cause significant harm to the natural ecosystem of the Site and thus, were not selected. In other words, elimination of ecological habitat along with possible releases during excavation of the contaminants provides a greater threat than leaving the contamination undisturbed and addressing it with engineering controls. This action will also address groundwater to determine if contaminant concentrations improve through time as removal actions and the selected remedy are expected to result in achieving protective levels for drinking water exposures.

The selected remedy for the wetland soils is to place a cap on contaminated soil along the pipeline right-of-way in the wetlands located on the west side of the Site. The pipeline right-of-way area has the highest contaminant concentrations within the wetlands and thus, the selected remedy will result in significant reduction of exposure to contaminants while minimizing the destruction or disturbance of the natural habitat.

The selected remedy for non-wetland soils is to place a cap over the contaminated soils, and thus not only preventing exposure to surficial contamination, but also eliminating exposure to subsurface contamination. This cap will also reduce infiltration and potential migration of soil contamination even though not required for groundwater protection. Since this cap is only necessary to prevent direct exposure, vegetation will be allowed to grow and thus replace any habitat loss through placement of the cap.

12.0 SITE CHARACTERISTICS

12.1 – Site Description

The EVR-Wood Site (CERCLIS ID: LAN000605517) spans approximately 200 acres and is located northeast of the City of Jennings, Louisiana, in an unincorporated area of Acadia Parish, Louisiana (Figure 1). The EVR-Wood Site is bounded to the north by a wooded area containing numerous oil production facilities; to the east by a residential area and agricultural land; to the south by a wooded area; and to the west by a wooded area, wetlands, and the Bayou Nezpique. According to the U.S. Census Bureau, about 9,800 people lived in Jennings in 2019. Land uses nearby include agricultural, residential, commercial, and recreational uses. Residences near the Site are connected to the Acadia Parish public water system.

The Site includes areas once occupied by the EVR-Wood Treating Company (EVR-Wood) and the Evangeline Refining Company (Evangeline). EVR-Wood facilities (wood-treating) were located north of Evangeline facilities (oil refining); however, no distinct boundary existed between the facilities. The Evangeline Refinery ceased operations in 1983. The EVR-Wood company ceased operations and closed the business in May 1985. By October 2004, the storage of hazardous materials had ceased, and the remaining tanks had been removed from the Evangeline Tank Farm.

The Site is underlain by the Chicot Aquifer System, which is a complex system of interconnected layers of clays, silts, sands, and gravels that dip predominantly to the south. In southwest Louisiana, the Chicot Aquifer System is the principal source of fresh groundwater. Dense surficial clays, known as the Chicot Aquifer System surficial confining unit, generally extend to approximately 30 to 40 feet below ground surface (bgs) at the Site. This surficial

confining unit has interbedded sand zones of varied areal extent and thickness, known as the shallow sands. At the Site, the shallow sands are dewatered due to long-term pumping withdrawals. Below the shallow sands, the Upper Sand is composed of coarse sand and gravel and is typically more than 400 feet thick. Most wells in Acadia Parish are drilled into the Upper Sand portion of the aquifer. Depth to water in the Chicot Aquifer beneath the Site ranges from approximately 50 to 65 feet bgs.

The Site is located on the eastern edge of the Bayou Nezpique. Relief at the Site is very low with a slight westward dip, as drainage pathways flow west from the Site towards the wetlands, and into Bayou Nezpique. Given the proximity to the Bayou Nezpique and low relief, the Site is often subject to flooding. Most of the Site lies within the 100-year floodplain (Figure 3). In addition to the Bayou Nezpique, the former Cooling Pond is a freshwater pond on the western edge of the impoundments. Apart from the open field in the area of historical activities (i.e., Evangeline Refinery, Evangeline Tank Farm, Impoundments, and a portion of the EVR-Wood Process Facility), the Site is forested. The forested areas on the western and southern portions of the Site contain swamps dominated by bald cypress (*Taxodium distichum*).

The Site has numerous operational areas which are depicted in Figure 2. Historical wood treatment and refinery activities at the Site have resulted in the release of contaminants to Site soils and sediment. Arsenic, PCP, PAHs, and polychlorinated dibenzodioxins (dioxins) and polychlorinated dibenzofurans (furans) are the primary chemicals of concern (COC). The following sections provide a summary of the nature and extent of contamination in the various areas of the Site.

The conceptual model for the Site for human health and ecological receptors is illustrated in Figures 4 and 5 (Figure 4 Human Health and Figure 5 Ecological). Potentially completed exposure pathways were identified for the following human receptors - residential, commercial/industrial workers, construction workers, and trespasser. Figure 6 presents a graphical presentation of the human health conceptual site model. Potentially completed exposure pathways were identified for the following specific and representative receptor groups – wetland and aquatic plants, aquatic and benthic organisms, herbivorous wildlife, piscivorous wildlife, terrestrial plants, soil invertebrates, insectivorous wildlife, predatory wildlife, reptiles, and amphibians. Figure 7 presents a graphical presentation of the ecological conceptual site model.

12.2 – Sampling Strategy

Samples collected were analyzed to characterize chemical and/or physical characteristics of various environmental media at the Site. Sampling activities were performed in six different sampling events that took place from January 2015 to August 2016. Table 1 provides a summary of all investigatory samples collected during the Remedial Investigation. Surface water sample locations, sediment sample locations, surface soil sample locations, subsurface sample locations, fish sample locations, crayfish sample locations, and groundwater sample locations are depicted on Figures 8, 9, 10, 11, 12, 13, and 14, respectively.

12.3 – Sources of Contamination

The Site has numerous operational areas, which are depicted in Figure 2, are all suspected sources of contamination. Major potential source areas include:

- AST, UST, OWS
- Contaminated soils in the EVR-Wood Process Area, a result of spills, drips, or leaks during former processing operations
- Contaminated soils in Impoundments One, Two, and Three, a result of waste disposal from wood treatment and refinery operations
- Pits Two and Three, a result of waste disposal during former facility operations
- Debris Pile One, a result of waste disposal during former facility operations

Generally, these major source areas cover an area of approximately 2 acres.

12.4 – Nature and Extent of Contamination

Chemicals that were detected in surface water, sediment, soil, and fish tissue that are Chemicals of Concern (COC) are arsenic, PCP, polycyclic aromatic hydrocarbons (PAHs), and dioxins. These chemicals are the most prevalent (in terms of screening level exceedance and magnitude) and are generally co-located with each other. PAHs include acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene.

The following provides a summary of the nature and extent of contamination in the various areas of the Site.

<u>EVR-Wood Process Facility</u>

The EVR-Wood Process Facility has elevated concentrations of all the primary COCs and numerous other analytes in soil. These impacts are associated with historic wood treating and/or refinery operations. Arsenic, PAHs, PCP, and dioxins have a similar distribution pattern in soil, very high concentrations in soil near the location of the former AST and the southwestern corner of the wood treating process area, and elevated, but much lower, concentrations in surface soil that generally decrease in concentration with distance from these areas. Naphthalene and PCP both have elevated concentrations at depth. The highest arsenic concentration detected in surface soil was 1,720 milligrams per kilogram (mg/kg) while most of the other sample points had arsenic concentrations of 73.3 mg/kg or lower.

The maximum carcinogenic polycyclic aromatic hydrocarbon (cPAH) toxicity equivalence (TEQ) value in soil were found at the surface at 13.5 mg/kg and PCP was detected at a maximum concentration in surface soil at 3,200 mg/kg. Naphthalene concentrations in soil are the most elevated in subsurface soil, with the maximum detected naphthalene concentration in soil of 170 mg/kg in a sample collected from 24 to 26 feet below ground surface (bgs). The maximum dioxin TEQ value in this area was 164,000 nanograms per kilogram (ng/kg).

The contents of the AST, UST, and OWS (which were removed from the Site in Spring 2019), and the soil adjacent to the AST located within the EVR-Wood Process Facility Area were all sampled during the RI. These samples contain some of the highest observed concentrations detected at the Site. Arsenic was detected in soil at a maximum concentration of 338 mg/kg, the OWS sludge sample was similar in concentration at 311 mg/kg. The maximum cPAH TEQ value and naphthalene result in sludge from the AST were 1,820 mg/kg, and 3,160 mg/kg, respectively. Sludge from the AST contained an estimated 30,500 mg/kg of PCP.

Impoundments

There are seven former impoundments located just west of the EVR-Wood Process area which have a soil cover on them. Generally, the most northern Impoundments One and Two contain the most elevated concentrations of COCs. As you go south, Impoundment Three has lower concentrations than Impoundments One and Two, and Impoundments Four through Seven have fewer contaminants with lower concentrations. Contamination is likely a result of waste materials that were previously buried in the impoundments or from surface water drainage bringing in contaminants from the process area.

Impoundment Two contains the most elevated concentrations of arsenic, PAHs, and PCP. Maximum detected concentrations are all detected at depth, with the majority of the contamination observed in samples ranging from 6 to 25 feet bgs, with the exception of arsenic.
The maximum detected arsenic concentration was 119 mg/kg with most elevated arsenic located above 8 feet bgs in the impoundments. The most elevated concentrations of PAHs are generally observed between 8 and 25 feet bgs. The maximum cPAH TEQ value was 90.4 mg/kg, while most other cPAH TEQ values from the impoundments do not exceed 20 mg/kg. The maximum detected concentration of naphthalene was 1,600 mg/kg. PCP highest concentration was 530 mg/kg. The highest observed dioxin value was detected in Impoundment Three at 32,500 ng/kg TEQ with most elevated dioxin concentrations generally being at depths less than 12 feet.

Pits

Pits Two and Three are located just north of the EVR-Wood Process Facility area and the impoundments. These pits have the highest observed soil concentrations of cPAHs, naphthalene, PCP, and dioxins of all samples collected at the Site. Concentrations from surface samples are the highest with arsenic detected at 494 mg/kg (PIT 2). Maximum concentrations detected were cPAH TEQ was 1,087 mg/kg (PIT 2), naphthalene at 10,000 mg/kg (PIT 2), and dioxin TEQ at 322,000 ng/kg (PIT 3). Concentrations of the various COCs decreased in depth until there were no detections of COCs at approximately 50 feet bgs.

Evangeline Refinery

The Evangeline Refinery area contains elevated concentrations of arsenic (maximum of 26 mg/kg), only four detections of cPAH (maximum TEQ of 0.0273 mg/kg), naphthalene (maximum of 5.4 mg/kg), PCP (maximum of 4.3 mg/kg), and dioxin TEQ (maximum of 32 ng/kg). Contaminants in

this area likely originated from material spilled at Evangeline or during mixing materials at EVR-Wood.

EVR-Wood Storage, Wood Chipper, Wood Laydown, and Northern Tanks

The Northern Tanks, Wood Chipper, Wood Laydown, and EVR-Wood Storage areas all contain various levels of contamination. Generally, these areas are lower in concentration than other portions of the Site north of LA Hwy 97 and tend to have only surface impacts. The Northern Tanks and EVR-Wood Storage areas contain elevated concentrations of PAHs and PCP in soil (maximum cPAH TEQ of 4.08 mg/kg; maximum PCP of 90 mg/kg; and maximum naphthalene concentration of 7.33 mg/kg). All areas contain elevated concentrations of arsenic (maximum of 104 mg/kg) and dioxins in soil (maximum of 2,370 ng/kg). Elevated lead was also detected in the Northern Tanks area (maximum of 4,310 mg/kg). Contaminants in these areas likely originated from products and waste stored during former wood treating activities.

Evangeline Tank Farm

The Evangeline Tank Farm area contains elevated concentrations of arsenic, with the maximum concentration being 45.6 mg/kg.

Wetlands, Cooling Pond, and Bayou Nezpique

The wetlands contain elevated concentrations of arsenic, PAHs, PCP, and dioxins in soils. The concentrations of contaminants are generally higher when in close proximity to the process areas and decrease towards Bayou Nezpique. Based on the spread and magnitude of concentrations, contaminants likely originated from the former operations areas and migrated laterally west via surface water transport. Contaminants in the Cooling Pond may have originated from the Evangeline process water.

The maximum detected arsenic concentration in soil from these areas was 77.1 mg/kg. The maximum detected cPAH was 4.26 mg/kg and the maximum detected PCP concentration was 37.6 mg/kg. Elevated dioxin concentrations are widespread in surface soils throughout the wetlands and sediment in the cooling pond. The maximum detected dioxin TEQ value was 63,200 ng/kg which was at a sample location due west of the impoundments.

Debris Piles

The Debris Piles contain elevated concentrations of arsenic, iron, benzo(a)pyrene, and PCP. Contaminants in the debris piles likely originated from waste or chemicals that leaked from the storage containers or from contaminants washing off scrap metal and treated wood remnants.

Groundwater

Groundwater results from the Upper Sand indicate elevated concentrations of arsenic, barium, bis(2-ethylhexyl)phthalate, cadmium, lead, and PCP as indicated by EPA maximum contaminant

level (MCL) exceedances. Upon resampling locations in April and June 2018, the following locations exceeded MCLs:

- MW-108: Lead at 15.1 micrograms per liter [µg/L] (Action Level is 15 µg/L)
- MW-107: Arsenic at 21.8 µg/L (MCL is 10 µg/L)
- MW-113: Dissolved arsenic at 11 µg/L
- MW-111: Barium at 2,020 µg/L (MCL is 2,000 µg/L)
- GW-001-417: Cadmium at 12.5 µg/L (MCL is 5 µg/L)
- GW-001-417: Lead at 563 µg/L.

The site-specific Human Health Risk Assessment determined that the potential risks estimated for exposure to groundwater are not considered likely to pose health concerns. Furthermore, lead results from GW-001-417, which is the former wood treating process water well are not considered representative of aquifer conditions. Due to the age of the well and the condition of the casing as determined through video analysis during the RI, the elevated lead concentration in this well is probably a result of debris from previous pumps remaining in the well and not related to Site conditions. This well was plugged in March 2020.

13.0 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

13.1 - Land Use

Agriculture remains an important part of Acadia Parish's economy, despite a recent increase in other industries. Land use in Acadia Parish is primarily agricultural; 65 percent of the parish is cropland, 9 percent is pastureland, and 16 percent is forest land. Almost the entire Site lies within the 100-year floodplain. The portion of the Site north of Highway 97 is almost all undeveloped forest land, except for the former process areas. The primary activity that takes place on this portion of the Site is hunting by the private landowner. The portion of the Site south of Highway 97, where the previous tank farm was located, is primarily open undeveloped property.

Given the undeveloped nature of the Site, as well as the Site almost entirely being within the 100-year floodplain (Figure 3) and is subject to flooding, it is likely the Site will not be used for residential purposes. The most likely reasonably anticipated future land use is industrial/commercial or recreational.

13.2 - Groundwater

In Acadia Parish, approximately 70 percent of the water withdrawn from the Chicot Aquifer was used for rice irrigation and approximately 25 percent of the water was used for aquaculture. The remainder of the water was used for public supply, general irrigation, rural domestic, power generation, livestock, and industrial purposes, listed in order of decreasing use. There are some private water wells that withdraw from the Chicot Aquifer to the east of the Site. These private water wells were sampled during the RI, and there were no exceedances of Maximum Contaminant Levels which are Safe Drinking Water Act standards that are set by the United States Environmental Protection Agency (EPA) for drinking water quality.

Groundwater Beneficial Use

The National Contingency Plan (NCP) establishes an expectation to "return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable, given the particular circumstances of the site" 40 Code of Federal Regulations [CFR] Section 300.430(a)(1)(iii)(F). The EPA generally defers to Comprehensive State Groundwater Protection Programs (EPA/540/G-88/003, EPA, 1988) to define groundwater beneficial uses. The Louisiana Department of Environmental Quality's (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) regulations identifies three groundwater/aquifer beneficial use classes.

As described in the 2013 Conceptual Site Model Technical Memorandum and the 2017 RI Report, wells in the Chicot Aquifer commonly yield 500 to 2,500 gallons per minute. Annual ground water withdrawal in Acadia Parish reached a maximum in the early 1980s, when more than 300 million gallons per day were withdrawn. Following a decreasing trend in withdrawal rates, annual ground water withdrawal in Acadia Parish has been increasing since the mid-1990s; 2010 data indicates greater than 180 million gallons per day were removed from the aquifer.

The EPA has designated the Chicot Aquifer as a sole source aquifer (SSA), which is an aquifer that supplies at least 50 percent of the drinking water for its service area, and there are no reasonably available alternative drinking water sources, should the aquifer become contaminated.

13.3 - Surface Water Hydrology

The Site is located on the eastern edge of the Bayou Nezpique, a freshwater perennial stream. It is approximately 3.5 miles north of the confluence of the Bayou Nezpique and the Mermentau River, a commercial and recreational fishery. The annual flow of the Bayou Nezpique, near Basile, Louisiana, approximately 16 miles north of the Site, is highly variable (e.g., from 100 to 1,200 cubic feet per second [cfs]). The average stream flow for the Mermentau River is 1,584 cfs, which characterizes it as a large stream to a river.

Surface water generally flows to the south-southeast, towards the Gulf of Mexico. However, low topographic relief results in occasional bi-directional flow (NRCS 2006). Flooding is a common occurrence in the area, a result of both low topographic relief and proximity to the Gulf of Mexico.

Drainage pathways flow west from the Site towards the wetlands and into Bayou Nezpique. A drainage pathway south of the Cooling Pond flows from the Evangeline Refinery Area through the Impoundment Area toward the Bayou Nezpique, approximately 0.2 miles from the Evangeline Refinery Area.

Groundwater–Surface Water Interaction

Ground water elevations in the Chicot Aquifer are 50 ft or more below the elevation of Bayou Nezpique in response to decades of ground water withdrawals. Therefore, surface water discharges to ground water.

Surface Water Beneficial Use

There are seven designated surface water beneficial uses under Louisiana Administrative Code 33:IX §1111: agriculture, drinking water supply, fish and wildlife propagation, outstanding natural resource waters, oyster propagation, primary contact recreation, and secondary-contact recreation. Designated uses assigned to a subsegment apply to all water bodies (listed water body and tributaries/distributaries of the listed water body) contained in that subsegment, unless unique chemical, physical, and/or biological conditions preclude such uses.

The designated uses for Bayou Nezpique (LA050301_00) are primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP), and agriculture (AGR). Based on the EPA approved 2020 Water Quality Integrated Report, PCR is impaired due to elevated fecal coliform. FWP is impaired due to low dissolved oxygen, fipronil, lead, mercury, nitrate/nitrite nitrogen, total phosphorus, and turbidity. Suspected sources are as follows:

Impairment	**Suspected Source**
Low Dissolved Oxygen, Nitrate/Nitrite, Total Phosphorus, Turbidity, Fipronil	Agriculture
Lead	Source Unknown
Mercury in fish tissue	Atmospheric Deposition
	Source Unknown
Fecal Coliform	Package Plant or Other Permitted Small Flow Discharges
	Runoff from Forest/Grassland/Parkland
	Rural (Residential Areas)

14.0 SUMMARY OF SITE RISKS

The role of the baseline risk assessment is to quantify the risk associated with potential exposure to hazardous substances at a site in the absence of any remedial action or control, including institutional controls. As part of the Remedial Investigation, a Human Health Risk Assessment (HHRA) (December 2017) and a refined Screening Level Ecological Risk Assessment (SLERA) (January 2018) was conducted to determine the current and possible future effects of contaminants on human health and ecological receptors if contaminants were not addressed. The Site currently consists of mainly undeveloped wooded areas, except for the former refinery process area and the tank farm area south of Highway 97. Generally, the western portion of the Site is considered a swamp, since it is wooded area that is inundated a significant portion of the time. Due to the undeveloped nature of the Site, as well as the Site almost entirely being within the 100-year

floodplain (Figure 3), the reasonably anticipated reuse for the Site will be commercial/industrial or recreational.

The HHRA focused on health effects for adolescent recreational users, commercial workers, and construction workers that could result from exposure to (1) contaminated soils, (2) groundwater, (3) fish ingestion, (4) Bayou Nezpique sediments and surface water, (5) swamp soil and surface water, (6) air particulates, and (7) soil vapor. The SLERA evaluated risk to aquatic and terrestrial ecological receptors though contaminated soil, surface water, and sediment across the Site.

14.1 - Human Health

As part of the 2017 RI, a baseline human health risk assessment was conducted to determine the possible effects of contaminants on human health. This risk assessment premised the exposure setting characterization on industrial/commercial or recreational use as the future use of the Site (Section 13.1) but also evaluated a residential exposure scenario.

The risk assessment followed a four-step process:

a. Hazard Identification (Identification of COCs) – Constituents of Potential Concern (COPC's) are those contaminants that are carried forward through the risk assessment. COC's are a subset of the COPC's that are identified to be addressed by the response action in the ROD.
b. Exposure Assessment – Estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingestion of contaminated soil) by which humans are potentially exposed.
c. Toxicity Assessment – Determines the types of adverse health effects associated with chemical exposures, and the relationship between the magnitude of exposure and severity of adverse effects, and
d. Risk Characterization – Summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of health risks.

With the completion of this four-step risk assessment process, those exposure pathways and Site related COC's determined to pose actual or potential threats to human health were identified for remedial action. The risk assessment did not include an evaluation of the principal threat wastes at the Site. The principal threat wastes were addressed by removal actions which eliminated the potential toxicity and mobility of the principal threat wastes.

14.1.1 – Identification of Contaminants of Concern

Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, 2-methylnaphthalene, indeno(1,2,3-c,d)pyrene, naphthalene, pyrene, 2,6-dinitrotoluene, 1,1'-biphenyl, benzene, ethylbenzene, PCP, and lead were identified as COCs for human health receptors from exposure to surface soil (0 to 2 feet bgs) (Table 2).

Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and PCP were identified as COCs for human health receptors from exposure to sediment (Table 2).

Dioxin TEQ, arsenic, hexavalent chromium, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, 2-methylnaphthalene, indeno(1,2,3-c,d)pyrene, naphthalene, pyrene, 1,1'-biphenyl, and PCP were identified as COCs for human health receptors from exposure to subsurface soil (2 to 15 feet bgs) (Table 2).

Arsenic, chromium, copper, lead, mercury, vanadium, dioxin TEQ, HMW PAHs, LMW PAHs, total PAHs, bis(2-ethylhexyl)phthalate, PCP, 1,1'-biphenyl, 2,3,4,6-tetrachlorophenol, dibenzofuran, and total xylenes were identified as COCs for ecological receptors from exposure to soil or sediment (Table 3).

A complete discussion of the identification of COC's is presented in the Risk Assessment and the Feasibility Study.

14.1.2 – Exposure Assessment

The HHRA evaluated potential risks to the following receptor groups: adolescent recreational users, commercial workers, and construction workers. The HHRA also evaluated risk to potential residents (adults and children) for illustrative purposes only since the Site will not be utilized for residential use, due to almost the entire Site being within the 100-year floodplain. In addition, the focus was primarily on the adolescent recreational user for the wetland area, seeing that commercial/industrial activity in this area would not occur due to periodic inundation, except for gas pipeline maintenance.

The Site was divided into four separate areas (see Figure 15) for evaluation in the HHRA, due to its overall size and configuration. Selection of areas was based on past use and layout of the Site and are as follows:

Area 1 – North of Highway 97 includes the former Evangeline Refinery, all portions of the former EVR-Wood facility (except for the former Process Area), and the surrounding wetlands and wooded areas.

Area 2 – South of Highway 97 includes the former Evangeline Tank Farm and the surrounding wetlands and wooded areas.

Area 3 – Process Area encompasses the former EVR-Wood process area, including the former impoundments and nearby pits (Pits Two and Three).

Area 4 – Bayou Nezpique includes the bayou areas extending approximately 0.25 miles north and south of LA Hwy 97.

The following exposure pathways are considered potentially complete for the residential scenario:
• Incidental ingestion of soil
• Dermal contact with soil
• Ingestion of homegrown produce in contact with soil
• Inhalation of particulates from windblown soils released to outdoor air
• Ingestion of fish
• Incidental ingestion of sediment and surface water in wetlands and Bayou Nezpique
• Dermal contact with sediment and surface water in wetlands and Bayou Nezpique
• Ingestion of ground water
• Dermal contact with ground water
• Inhalation of chemicals volatilized from ground water during domestic use
• Inhalation of chemicals volatilized to outdoor air from soil
• Inhalation of indoor air vapors from ground water and soil vapor intrusion.

The following exposure pathways are potentially complete for the recreational user scenario:
• Incidental ingestion of surface soil
• Dermal contact with surface soil
• Inhalation of particulates from windblown soils released to outdoor air
• Ingestion of fish
• Incidental ingestion of sediment and surface water in wetlands and Bayou Nezpique
• Dermal contact with sediment and surface water in wetlands and Bayou Nezpique.

The following exposure pathways are potentially complete for the commercial/industrial worker scenario:
• Incidental ingestion of surface soil
• Dermal contact with surface soil
• Inhalation of particulate from windblown soils released to outdoor air
• Ingestion of ground water
• Dermal contact with ground water
• Inhalation of chemicals volatilized from ground water during use as a water supply
• Inhalation of indoor air vapors from ground water and soil vapor intrusion.

The following exposure pathways are potentially complete for the construction worker scenario:
• Incidental ingestion of soil
• Dermal contact with soil
• Inhalation of particulates from windblown soils in outdoor air
• Incidental ingestion of ground water
• Dermal contact with ground water
• Inhalation of chemicals volatilized from ground water into a trench.

14.1.3 – Toxicity Assessment

Toxicity values utilized in the risk assessment were obtained from a standard hierarchy of sources, as follows:

• EPA's Integrated Risk Information System (IRIS) database
• Provisional peer-reviewed toxicity value database maintained by the Office of Research and Development, EPA's National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center
• Other EPA and non-EPA sources including the Agency for Toxic Substances and Disease Registry Minimal Risk Levels (2016), the California Environmental Protection Agency (2017), Office of Environmental Health Hazard Assessment Toxicity Criteria Database, California Environmental Protection Agency Cancer Potency Values (2009), and the New Jersey Department of Environmental Protection (2008).

Non-carcinogenic Toxicity Values

Non-carcinogenic toxicity values were used in estimating potential adverse health effects associated with exposure to COPCs. Subchronic toxicity values were used for evaluating potential adverse health effects for construction workers, while chronic toxicity values were used for evaluating potential adverse health effects for recreators, commercial/industrial workers, and hypothetical residents. Where subchronic toxicity values were not available, chronic toxicity values were used as a conservative approach.

Carcinogenic Toxicity Values

Carcinogenic toxicity values were used in evaluating potential carcinogenic effects associated with exposure to known, probable, or possible carcinogens. These values were used to estimate the upper-bound lifetime statistical probabilities of a hypothetical individual developing cancer, as a result of exposure to a potential carcinogen.

14.1.4 – Risk Characterization

The risk characterization portion of the risk assessment combined the outputs of the exposure and toxicity assessments to quantify the health risks associated with the Site. The risk assessment organizes the types of risk at the Site according to various exposure scenarios. Each exposure scenario specifies the type of human receptor (e.g., future commercial/industrial worker), the exposure pathway (e.g., ingestion), and the COC. If a contaminant or exposure scenario is found to produce a risk which will require a remedial action (based on either the carcinogenic risk or the non-cancer hazard index) that contaminant or exposure scenario is said to "drive the risk" or "drive" the need for action. A remediation level is set for Site related COCs that drive risk (Table 4).

Risk characterization also considers the nature of and weight of evidence supporting the estimates, as well as the magnitude of uncertainty surrounding such estimates. Although the risk assessment produces numerical estimates of risk, these numbers do not predict actual health outcomes. The estimates are calculated to overestimate risk, and thus any actual risks are likely to be lower than these estimates and may even be zero.

The HHRA identified potential concerns for human health from exposure to surface soil, subsurface soil, and/or sediment in Area One – North of Highway 97, and Area Three – Process

Area. Dioxin TEQ and arsenic were identified as the primary Site related COCs. In Area Three – Process Area, PAHs, SVOCs, and VOCs were also identified as COCs with significant contribution to estimated risks, while in Area One – North of Highway 97, PAHs and SVOCs are considered COCs that act as relatively minor contributors. The results of the HHRA indicate that if no remedial actions or other means of control are taken to mitigate exposures to site media in these areas, then there is a potential for an increased probability of cancer and a potential for systemic effects for the specific receptor groups.

The HHRA concluded that exposures to media in other portions of the Site, including exposure to soils and sediment in Area 2 – South of Highway 97, are within EPA's risk management range and unlikely to pose unacceptable human health concerns to potential receptors. Potential risks from exposure to media in Area 4 - Bayou Nezpique, including consumption of fish tissue, were largely found to be consistent with background conditions. Further, there were no unacceptable human health concerns identified for current or future exposures to surface water at the Site, and potential risks estimated for exposure to groundwater are not considered likely to pose health concerns.

14.1.5 – Uncertainty Analysis

The assumptions used in the risk assessment had inherent uncertainty. While it is theoretically possible that this uncertainty led to under- or over-estimates of potential risk, the use of numerous upper-bound assumptions most likely resulted in conservative estimates of potential risks.

Data Evaluation Uncertainty – Uncertainty may have come from many sources, such as the quality of data used to characterize the ACW Site, and the process used to select data and COPC's used in the risk assessment.

Exposure Assessment Uncertainty – Concentrations used in the risk assessment based upon small number of samples could have been biased high and may have led to an overestimation of actual exposure and estimates of potential risk.

Toxicity Assessment Uncertainty – Some non-cancer toxicity values were not available for some COC's, which may have led to an underestimation of non-cancer hazards. Subchronic toxicity values were not available for various COPC's identified for the construction worker scenario and thus chronic toxic values were used as surrogate values. The use of chronic toxicity values for subchronic exposures may have led to overestimations of potential non-cancer hazards.

Preliminary Risk Evaluation Uncertainty – The use of maximum concentrations may have resulted in overestimation of potential exposure risks for both the residential and industrial scenarios. Using the mean concentrations which are lower than the maximum concentrations would have provided a more reasonable risk estimation for some constituents. The preliminary risk estimates did not necessarily include contributions from some COPC's and therefore, risks may have been underestimated.

Risk Characterization – In characterizing the risk, pursuant to EPA guidance, the assumption was made that the total risk of developing cancer from exposure to Site contaminants was the sum of the

risk attributed to each individual contaminant and likewise, the potential for non-cancer effects was the sum of the hazard quotients estimated for exposure to each individual contaminant. This approach does not account for the possibility that constituents act synergistically or antagonistically. Therefore, there is uncertainty associated with the cumulative risks for carcinogens and hazard indexes for non-carcinogens.

14.2 – Ecological Risk

The purpose of an Ecological Risk Assessment is to characterize and quantify potential environmental impacts from chemicals in soil, sediment, and surface water at the Site. To determine environmental impacts, a refined SLERA was conducted for the Site. The assessment was conducted in accordance with the process outlined in the document *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA 1997) and other relevant EPA guidance. The complete SLERA is presented in the *Screening Level Ecological Risk Assessment, EVR-Wood Treating/Evangeline Refining Company, Jennings, Acadia Parish, Louisiana* (EA 2018).

The process for an ecological risk assessment outlined in EPA guidance includes eight steps (EPA 1997, 1998), and the refined SLERA presents the first three steps of the ERA process. Steps One and Two represent the SLERA. The SLERA uses highly precautionary assumptions regarding exposure and toxicity to develop a CSM and identify chemicals of potential concern (COPCs).

Step Three of the refined SLERA process is the Baseline Risk Assessment Problem Formulation (BRAPF). The BRAPF draws from the risk evaluation performed in the SLERA to identify COPCs, exposure pathways, assessment endpoints, and risk questions requiring further consideration. The BRAPF includes use of more realistic exposure and toxicity data; in this case data regarding Site-specific fish and crayfish tissue were used. The goal of the BRAPF is to provide a clear definition of the ecological risk problems for the Site. This problem formulation forms the basis for either further assessment or, in cases where sufficient data are available, risk management if necessary. For the Site, a SLERA and BRAPF refinement of risk calculations were performed.

The Site was divided into five separate exposure areas based upon potential sources, habitat, and connectivity, and each of the exposure areas were assessed individually in the SLERA (Figure 16). The five exposure areas are: Exposure Area One – Process Area (area where historical operations occurred), Exposure Area Two – Uplands Area North (upland area north of LA Hwy 97), Exposure Area Three – Uplands Area South (upland area south of LA Hwy 97), Exposure Area Four – Wetlands Area North (wetlands north of LA Hwy 97), and Exposure Area Five – Wetlands Area South (wetlands south of LA Hwy 97). Depending on conditions, the process area and wetlands areas may be dry or wet, so the exposure models ran the samples as surface soil, as well as sediment.

Except for Exposure Area Three: Uplands South, the SLERA found potential concerns for at least one receptor in each exposure area. The only COCs for Exposure Area Five: Wetland Area South is dioxins. The maximum dioxin TEQ concentration in the Wetlands Area South is 85 times less than the maximum concentration north of LA Hwy 97 and the 95 percent upper

confidence level of the mean is approximately 40 times less. The following are COCs in at least one exposure area and for at least one ecological receptor: arsenic, chromium, copper, lead, mercury, vanadium, dioxin TEQ, HMW PAHs, LMW PAHs, total PAHs, bis(2-ethylhexyl)phthalate, PCP, 1,1'-biphenyl, 2,3,4,6-tetrachlorophenol, dibenzofuran, and total xylenes. Table 3 presents the COCs for each exposure area and receptor. Reptiles and amphibians remained as an uncertainty in the SLERA and are not presented as there are no available toxicity values. A remediation level is set for Site related COCs that drive risk (Table 5).

14.3 – Basis for Action

As indicated in *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions* (EPA, 1991), where the cumulative ELCR to an individual based on reasonable maximum exposure for both current and future land use is less than a lifetime excess cancer risk of 1 x 10^{-4} (10^{-4}) and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts. The upper bound of the risk range is not a discrete line at 1 x 10^{-4}, although EPA generally uses 1 x 10^{-4} in making risk management decisions. A specific risk estimate around 1 x 10^{-4} may be considered acceptable if justified based on site-specific conditions. If groundwater or surface water is a current or future potential source of drinking water and maximum contaminant levels (MCLs), non-zero MCL goals, or other chemical-specific ARARs are exceeded, action is generally warranted.

The EPA uses a lifetime excess cancer risk of 1 x 10^{-6} (10^{-6}) as a point of departure for establishing preliminary remediation goals (PRGs). This means that a cumulative risk level of 10^{-6} is used as a starting point or initial protectiveness goal for determining the most appropriate risk level that alternatives should be designed to attain. The use of 10^{-6} expresses EPA's preference for remedial actions that result in risks at the more protective end of the risk range, but this does not reflect a presumption that the final remedial action should attain such a risk level. Factors related to exposure, uncertainty and technical limitation may justify modification of initial cleanup levels that are based on the 10^{-6} risk level. The subsections below discuss how the specific exposure and technical limitations at this Site justify selection of a remedy within the risk management range, but not at the 10^{-6} risk level.

<u>Exposure</u>

Addressing the swamp area potentially results in the loss of habitat. Using the point of departure risk level of 10^{-6} or a lifetime excess cancer risk level of 1 x 10^{-5} (10^{-5}) would result in the destruction of approximately 29.2 and 14.3 acres of swamp habitat, respectively. Most of the highest concentrations of contaminants in the swamp are located on or near the gas pipeline right-of-way, except for an area just west of the cooling pond. The most probable point of entry into the swamp area for a recreational user is from the gas pipeline easement since it is maintained to minimize vegetative growth. An adolescent trespasser would probably not trek the entire swamp area included in the 10^{-6} area but would be more likely to encounter the highest concentrations along the gas pipeline right-of-way, due to the ease of access provided by the easement. Using a 10^{-5} risk level would address the highest concentrations in the swamp area and thus address most of the probable exposure. The consideration of exposure is why a 10^{-5} risk cleanup level was chosen as opposed to a 10^{-6} point of departure cleanup level.

Technical Limitations

As described above, addressing the swamp area potentially results in the loss of habitat, regardless of which risk level is utilized. Excavating contaminated areas from the swamp will be technically challenging, given that the swamp is inundated most of the year. This would entail clearing trees and vegetation (predominant on the Site), excavating soil to lower the land surface, disposing of the soil off-site or somewhere else on-site, and replanting bald cypress and water tupelo. In addition, removing the swamp habitat will require wetland mitigation in the form of the purchase of credits from a mitigation bank or construction of new wetlands. In the construction of new wetlands, woodland habitat would be lost. In essence, the creation of new wetlands would destroy existing habitat. Like the exposure considerations above, the use of the 10^{-5} risk level would minimize the destruction of the existing wetland habitat, but at the same time be sufficient at addressing the highest concentrations of contaminants. Therefore, the 10^{-5} risk cleanup level was chosen as opposed to a 10^{-6} point of departure cleanup level.

Human Health

Human Health exposure areas were described in Section 14.1.2. Illustrated below are the carcinogenic risks above the 10^{-5} risk level and the non-carcinogenic risks above the HI=1 level in Exposure Areas 1 and 3. The HHRA concluded that exposures to media in other portions of the Site, including exposure to soils and sediment in Area 2 – South of Highway 97, are within EPA's risk management range and unlikely to pose unacceptable human health concerns to potential receptors. Potential risks from exposure to media in Area 4 - Bayou Nezpique, including consumption of fish tissue, were largely found to be consistent with background conditions. Further, there were no unacceptable human health concerns identified for current or future exposures to surface water at the Site, and potential risks estimated for exposure to groundwater are not considered likely to pose health concerns.

Exposure Area 1

Receptor	Media	Risks	COC's
Construction Worker	Surface Soil	Non-Cancer – 6	NC – Dioxin TEQ, Arsenic
Commercial Worker	Surface Soil	Cancer – 1 X 10^{-4} Non-Cancer – 2	C – Dioxin TEQ, Arsenic NC – Dioxin TEQ, Arsenic
Adolescent Recreational User	Sediment (Swamp Soil)	Cancer – 1 X 10^{-4} Non-Cancer – 10	C – Dioxin TEQ, Arsenic NC – Dioxin TEQ, Arsenic

Exposure Area 3

Receptor	Media	Risks	COC's
Construction Worker	Surface Soil	Cancer – 6 X 10^{-4} Non-Cancer - 324	C – Dioxin TEQ, Arsenic, PAH's NC – Dioxin TEQ, Arsenic, PAH's
Construction Worker	Subsurface Soil	Cancer – 2 X 10^{-4} Non-Cancer - 108	C – Dioxin TEQ, Arsenic, PAH's NC – Dioxin TEQ, Arsenic, PAH's
Commercial Worker	Surface Soil	Cancer – 4 X 10^{-3} Non-Cancer – 91	C – Dioxin TEQ, Arsenic, PAH's NC – Dioxin TEQ, PAH's
Adolescent Recreational User	Surface Soil	Cancer – 9 X 10^{-3} Non-Cancer – 40	C – Dioxin TEQ, Arsenic, PAH's NC – Dioxin TEQ

Ecological

Ecological exposure areas were described in Section 14.2. Table 3 illustrates the receptors in each area that have potentially unacceptable risks and the analytes that are driving the risks.

Basis for Action Summary

The remedy in this ROD addresses all the above potential unacceptable risks to the various human health and ecological receptors. Even though groundwater does not pose a health concern, groundwater monitoring will be a part of the remedy to gather information to determine if further action is needed concerning groundwater, as well as to verify the remedial action is functioning as intended and not allowing releases of contaminants to groundwater.

15.0 REMEDIAL ACTION OBJECTIVES

15.1 - Remedial Action Objectives

Remedial Action Objectives (RAO) are narrative statements that describe what the remedial action is intended to accomplish. They identify the COCs, the environmental media, exposure pathways and receptors to be protected, and the level of cleanup to be achieved. The anticipated future land use is commercial/industrial or recreational, based on the RI/FS. Based on the above human health and ecological risks that need to be addressed, as determined by the HHRA and SLERA, the RAO's for the Site are:

RAO #1 - Prevent commercial worker, construction worker, and adolescent recreational user exposure to dioxin, arsenic, and polycyclic aromatic hydrocarbons in surface soil exceeding health based cleanup levels identified in Table 4, in the upland and swamp areas North of Highway 97 (Area 1).

RAO #2 - Prevent commercial worker, construction worker, and adolescent recreational user exposure to dioxin, arsenic, and polycyclic aromatic hydrocarbons in surface soil, subsurface soil, and pond sediment exceeding health based cleanup levels identified in Table 4 in the Process Area (Area 3).

RAO #3 - Reduce ecological receptor exposure to arsenic, chromium, copper, lead, mercury, vanadium, dioxin, and polycyclic aromatic hydrocarbons identified in Table 5, in surface soil in upland and wetland areas North of Highway 97 (Area 1) and the Process Area (Area 3).

RAO #4 –Prevent human consumption/exposure to groundwater above MCLs or Action Levels.

15.2 - Cleanup Levels

Final Cleanup Levels – Table 4 provides the cleanup levels for soils and sediments to address unacceptable human health risks. Table 5 provides the cleanup levels for soils to address unacceptable ecological risks. These cleanup levels address risk for Current/Future Adolescent Recreators, Future Commercial/Industrial Workers, Future Construction Workers, and numerous ecological receptors. The cleanup levels for soils and sediments are for a commercial/industrial or recreational scenario and achieve a 1.0 X 10^{-5} cancer risk level: the probability of 1 individual in 100,000 developing cancer due to exposure to the individual contaminant. The cancer risk of 10^{-5} is the midpoint of the EPA acceptable excess cancer risk range of 10^{-4} to 10^{-6}. Factors that were considered in selecting the 10^{-5} levels, as opposed to the 10^{-6} point of departure levels [see 40 CFR 300.430 (e)(2)(i)(A)(2)], were exposure potential and technical limitations to remediation. An additional approximate 15 acres would be subject to clearing and grubbing to meet the 10^{-6} levels, which would impact the ecological diversity at the Site since most of these additional acres are heavily wooded/vegetated. In addition, the 10^{-5} levels are consistent with Section 2.14 of the Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program (RECAP) (LDEQ, 2003).

15.3 – Basis and Rationale for Remedial Action Objectives

The basis for the commercial/industrial or recreational RAO's for the contaminated Site media is the anticipated long-term future land use for the Site.

The purpose of the caps described in the selected remedy is to reduce the potential exposure of contamination to human health and ecological receptors. Even though groundwater does not pose a health concern, groundwater monitoring will be a part of the remedy to gather information to determine if further action is needed concerning groundwater as well as to verify the remedial action is functioning as intended and not allowing releases to groundwater.

15.4 – Risks Addressed by Remedial Action Objectives

The risks addressed by remediation include:

- Reduction of risk from ingestion and dermal contact to soils, ingestion and dermal contact to groundwater, inhalation of particulates from windblown soils released to outdoor air, and inhalation of chemicals volatilized from groundwater into a trench to future commercial/industrial workers/construction workers
- Reduction of risk from ingestion and dermal contact to surface soil, ingestion and dermal contact of sediment, and inhalation of particulates from windblown soils released to outdoor air to adolescent recreators
- Reduction of risk from ingestion to terrestrial ecological receptors

16.0 DESCRIPTION OF ALTERNATIVES

As described in the Scope and Role of the Operable Unit or Response Action section above, the purpose of the RI/FS was to develop a remedy for the Site which would lead to achievement of the Site's cleanup objectives. Remedial Alternatives for the Site which were evaluated in the RI/FS are presented below.

Common Elements

Common elements are components that are common to all the alternatives, except for Alternative 1 – No Further Action. The common elements are described below.

Institutional Controls – The areas subject to remediation were determined based on PRGs that will not allow for unlimited use and unrestricted exposure at the site. Therefore, ICs (e.g., conveyance notices or zoning ordinances) will be implemented to limit future land use at the Site to recreational use or commercial and industrial use, as appropriate, for all remedial alternatives.

Remedial alternatives that require the construction of a containment cell, the solidification of soil in-place, or the placement and/or maintenance of a cap will require an IC (e.g., restrictive

covenant) to ensure that the cell, solidified soil, or cap is not damaged by future site activities.

The ICs would require periodic evaluations to ensure they are being implemented as intended during Five Year Reviews.

Structure and Debris Removal – Several structures and debris from the former wood-treating and refinery operations remain on-site and require removal. The structures and debris consist of the following: (1) the remnants of the seven former ASTs in the Northern Tanks area, (2) Debris Piles One through Six, (3) debris present at Pits One and Four (e.g., metal pipes, etc.), and (4) a pile of metal scraps and banding near Pit Two.

The remnants of the ASTs in the Northern Tanks area and other debris will be loaded onto vehicles (e.g., dump trucks) and hauled off-site for disposal. The AST remnants and debris will be classified as hazardous waste for the purposes of disposal. The total volumes of the AST remnants, the six debris piles, the debris at Pits One and Four, and the pile of metal scraps and banding were estimated to be 1,000, 1,800, 600, and 300 cubic yards, respectively.

Underground Gas-Pipeline – The underground gas pipeline intersects the remediation areas. According to Boardwalk Pipeline Partners, the company that currently manages the pipeline, the pipeline is a 10-inch diameter steel pipe that was likely installed during the 1930's. The pipeline is buried approximately 1 to 5 feet bgs in the non-wetland portions of the Site. The depth of the pipeline in the wetlands is unknown and is assumed to be similar to the non-wetland areas.

Implementation of the various remedial alternatives, which will require intrusive or non-intrusive activities near the pipeline (e.g., excavation or placement of heavy loads on the soil and sediment that cover the pipeline), may pose a safety concern to workers. The remedial alternatives were assembled to include one of the following three approaches to evaluate the feasibility of implementation, considering the potential safety concerns, breach of the pipeline, and meeting the remedy objectives:

- Approach A – Reroute the pipeline and address the remediation areas adjacent to the pipeline
- Approach B – Leave the remediation areas adjacent to the pipeline in-place and work around the pipeline
- Approach C – Place a cap over the pipeline and the remediation areas adjacent to the pipeline.

Regardless of which approach is included in the future selected remedial alternative, the design and implementation of the alternative should be coordinated with the pipeline company to take precautionary measures that can decrease the risk of working near the pipeline (e.g., shut down the pipeline during work activities or decrease the pressure in the pipeline).

Long-term Groundwater Monitoring – As indicated by the Site risk assessment, the estimated potential risks for exposure to groundwater is not likely to pose health concerns, and therefore, groundwater does not require remediation. The process water well was plugged in March 2020, which eliminated a potential conduit for contaminant migration to the Chicot Aquifer. In addition, all the potential cleanup alternatives will eliminate or reduce the potential for contaminants to leach to the Chicot Aquifer. Therefore, groundwater monitoring will be part of all the various remedial alternatives to gather information to determine if further action is needed concerning groundwater, as well as to verify the remedial action is functioning as intended and not allowing releases to groundwater.

The capital cost for the Common Elements is $1.6 million.

Sediment (Swamp Soil) Alternatives

Alternative SED-1 – No Further Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction Timeframe: N/A
Estimated Time to Achieve RAOs: N/A

Section 300.430 (e)(6) of the NCP requires the inclusion of a no action alternative in the RI/FS, or a no further action alternative if an interim or final action is already underway, for use as a baseline to compare against other alternatives. Under this alternative, no remedial actions will be conducted at the Site. All contaminants will remain in place and will be subject to environmental influences. Furthermore, no action will be taken to prevent unauthorized access or development at the Site. No ICs to inform interested parties regarding Site conditions will be implemented.

Alternative SED-2 – Mechanical Excavation, Dewatering, and Off-site Disposal

Estimated Capital Cost: $68,200,000 to $76,600,000
Estimated Annual O&M Cost: $24,000 to $65,100
Estimated Present Worth Cost: $68,200,000 to $76,600,000
Estimated Construction Timeframe: 21 to 23 months
Estimated Time to Achieve RAOs: 21 to 23 months

The purpose of Alternative SED-2 is to remove sediment (swamp soil) from the remediation area and to dispose of it at an off-site hazardous waste landfill (i.e., a Resource Conservation and Recovery Act [RCRA] Subtitle C landfill). The alternative consists of the following component(s):

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Mechanical Excavation*

- *Dewatering*
- *Off-site Disposal*
- *Site Restoration*.

Sediments will be removed by mechanical excavation utilizing conventional excavation equipment. The sediment remediation area consists primarily of forested wetlands. Trees and other vegetation will be cleared from the area to ensure all the sediment is accessible to the excavation equipment. Silt and sediment control barriers (e.g., silt curtains) will be set up around the perimeter of the remediation area to prevent soil/sediment and debris from migrating off-site.
Temporary barriers (e.g., portable cofferdams) will be installed to dewater the wetlands. Dewatering is required for conventional equipment to enter the wetlands and excavate the sediment. The water removed from the wetlands is assumed to not require treatment and will be discharged back to the wetlands.

This alternative assumes an access or haul road will need to be constructed to provide a stable surface for equipment operating in the dewatered wetlands. The road will be constructed to connect the staging area and the westernmost point of the sediment remediation area (near Bayou Nezpique) and will consist of a lime-stabilized subgrade with a crushed gravel surface. Crane mats will be placed, as needed, to provide a stable surface in the dewatered areas that are not reachable from the haul road. After trees and vegetation are cleared, conventional equipment will enter the dewatered areas, excavate the soil/sediment, and place it on off-road dump trucks. The dump trucks will transport the sediment to a staging area where it will be dewatered.

Dewatering will take place in the staging area by utilizing drying beds, a passive dewatering method. Drying beds allow moisture to drain and evaporate from the soil/sediment on a constructed structure. The drying beds will consist of a gravel layer underlain by asphalt (or other low-permeability material) and a geotextile fabric separating both layers. The perimeter of the beds will be lined with concrete barriers to form rectangular cells. The sediment will be placed on top of the gravel to begin the dewatering process. The sediment will be mixed by an excavator while in the beds, and Portland cement will be added, towards the end of the process, to decrease the drying time and to help solidify the sediment before off-site disposal. Water drained from the sediment will percolate to a collection drain at the bottom of the drying beds and will then be routed to an on-site mobile treatment unit. Because the primary COCs in sediment are arsenic and dioxins, which can be removed from water with typical water treatment processes, it is anticipated that the water generated from the sediment dewatering operations will be treated on-site and discharged to the wetland. The water will be treated with a mobile treatment unit consisting of flocculation, followed by adsorption with activated carbon. Dioxins, due to their low water solubility, are expected to be present primarily adsorbed onto suspended particles, which would be removed during the flocculation step. The remaining arsenic can be removed by adsorption with activated carbon. Samples of the treated water will be collected to verify that discharge criteria are met.

Three drying beds, (40 feet wide and 160 feet long), are estimated to be required, to allow the dewatering operations to fit within the proposed staging area and to keep pace with the excavation operations. After the sediment dewatering process is complete, the dried sediment will be loaded

onto conventional highway dump trucks and hauled off-site to a facility for treatment, if necessary, followed by disposal in a RCRA Subtitle C landfill. Samples of the dried sediment will be collected prior to disposal to help profile the sediment (e.g., for testing via the Toxicity Characteristic Leaching Procedure and the Paint Filter Liquids Test). The hazardous waste codes F032, F034, and F035 are anticipated to apply to wastes originating from the Site. Based on the sediment analytical results from the RI, incineration was assumed to be the treatment technology required prior to disposal. The drying beds will be dismantled after the excavated sediment has been dewatered.

The excavation areas will be backfilled to original grade with clean clayey soil and topsoil obtained from a local off-site source and restoration activities will take place after backfilling. Habitat restoration will consist of planting approximately 200 native tree saplings per acre. Bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) were selected as target species since they grow in the forest on-site and these species are good sources of food and habitat for wildlife. To enhance survivability from nutria, tree protection will be used on each sapling. Weed matting and erosion controls will be installed to further protect the restored areas.

Alternative SED-3 – Mechanical Excavation, Dewatering, and Consolidation in an On-Site Containment Cell

Estimated Capital Cost: $25,700,000 to $29,700,000
Estimated Annual O&M Cost: $82,575 to $85,593
Estimated Present Worth Cost: $26,700,000 to $30,700,000
Estimated Construction Timeframe: 21 to 23 months
Estimated Time to Achieve RAOs: 21 to 23 months

The purpose of Alternative SED-3 is to remove soil/sediment from the remediation area and to consolidate it in an on-site containment cell. The alternative consists of the following component(s):

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Mechanical Excavation*
- *Dewatering*
- *Site Restoration*.

The proposed location of the containment cell is south of LA Hwy 97, within the former Evangeline Tank Farm area. The areal footprint of the proposed location is large enough to consolidate the volume of all three contaminated media types, provided the containment cell is 30 feet tall, has slopes of 3:1 (horizontal: vertical), and is shaped (approximately) as a truncated pyramid. If only one or two of the media types will be consolidated on-site, then the resulting containment cell will cover an area smaller than the proposed location or will have a lower profile.

The proposed location was selected because the area is: (1) relatively clear of trees and structures, (2) within a portion of the Site that can be considered part of an Area of Contamination, and (3) is a relatively large area with land elevations (8 to 16 feet above sea level) that are close to the 100-year floodplain elevation (approximately 17 feet above sea level). The selection of an area with high elevations, relative to the 100-year floodplain elevation, will reduce the likelihood of washout of the containment cell during flooding and will minimize the impact the cell will have on flood elevations.

Minor clearing and grubbing of trees and vegetation will be required before the containment cell is constructed. The cell will be constructed to meet the requirements for hazardous waste landfills (i.e., RCRA Subtitle C cells), to minimize migration of leachate to groundwater. The cell will consist of a double liner and double leachate collection layers, a mound of compacted contaminated media, a cap, topsoil cover, erosion controls (e.g., riprap), and a perimeter fence. Due to its location within the floodplain and in an area susceptible to tropical storms, the cell will need to be designed to withstand frequent flooding (e.g., may include riprap armor, turf reinforcement matting).

The containment cell will require periodic O&M inspections to check for erosion of the cap and evidence of subsidence, to dispose of leachate, and to make repairs, as necessary. Maintenance of the cap will be performed following the inspections and will include mowing and removal of vegetation that may damage the cap (e.g., saplings). Long-term monitoring of groundwater is required to help determine if the containment cell is releasing contaminants to groundwater.

Alternative SED-4 – Monitored Natural Recovery

Estimated Capital Cost: $10,000 to $2,600,000
Estimated Annual O&M Cost: $44,584
Estimated Present Worth Cost: $600,000 to $3,200,000
Estimated Construction Timeframe: N/A
Estimated Time to Achieve RAOs: Unknown

The purpose of Alternative SED-4 is to use natural processes to reduce exposure to receptors and contribute to the recovery of the aquatic habitat. The alternative consists of the following component(s):

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Monitored Natural Recovery*

MNR relies on naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contamination in soil/sediment. Physical, biological, and chemical mechanisms may act together to reduce the risk to receptors from the contamination. Natural processes that reduce toxicity through transformation or reduce bioavailability through increased sorption are preferred, compared to reduced exposure through natural burial or mixing in-place, because the destructive/sorptive mechanisms generally have a higher degree of permanence. However, many contaminants that remain in soil/sediment are not easily transformed or destroyed. For this reason,

risk reduction due to natural burial through silting/sedimentation can be an acceptable soil/sediment management option.

Additional studies during the design phase are needed to determine whether natural burial processes are occurring over time at the Site that would reduce exposure to contaminated surface soils/sediments. The studies would need to determine whether natural silting/sedimentation is occurring, if the deposited soil/sediment will remain in place or erode, and to predict the time period to create a clean layer of soil/sediment that will reduce exposures to underlying contaminated sediment. Data collection may include time-series contaminant concentration data, surface soil/sediment physical characteristics, sedimentation rates, bathymetric changes, site hydrodynamics, and/or soil/sediment transport data to evaluate the viability of MNR at the Site. ICs, such as posted warning signs, would be implemented to limit recreational exposure during the MNR period. Ongoing monitoring for physical, chemical, and biological processes that transform, immobilize, isolate, or remove contaminants would be continued until surface soil/sediment no longer poses an unacceptable risk to receptors.

Alternative SED-5 – Enhanced Monitored Natural Attenuation

Estimated Capital Cost: $9,200,000 to $12,200,000
Estimated Annual O&M Cost: $44,584
Estimated Present Worth Cost: $9,800,000 to $12,800,000
Estimated Construction Timeframe: 8 months
Estimated Time to Achieve RAOs: Unknown

The purpose of Alternative SED-5 is to enhance natural recovery of the contaminated soil/sediment and reduce exposure from receptors. The alternative consists of the following component(s):

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *EMNR.*

EMNR consists of the same components as MNR (Alternative SED-4) and includes application of reactive sorbent amendments (activated carbon) to the contaminated surface soil/sediments to enhance the natural recovery processes. Direct placement of sorbent amendments to surface soil/sediment can reduce bioavailability to ecological receptors. The soil/sediment remediation area consists of forested wetlands and contains Cypress trees and Cypress tree knees. The Cypress tree knees provide a mechanism for the Cypress trees to obtain oxygen in areas inundated with water. The sorbent amendments can be applied onto the surface of the contaminated soil/sediment as a thin layer (approximately 0.5 inches), below the Cypress tree knee height, and mixed with the soil/sediments through natural processes with minimal impact to the aquatic environment.

The sorbent amendments would be broadcasted over the surface soil/sediment using a blower mounted to a marsh buggy. The marsh buggy, an amphibious vehicle, can navigate between trees to reach contaminated sediment and the blower can place amendment up to, approximately, 20 feet away from the buggy. Other delivery options may be used such as an excavator with a clam shell bucket or manual placement in hard to access areas. Haul roads would be constructed

to reduce travel times between the soil/sediment remediation areas and the staging area.

Silt and sediment control barriers (e.g., silt curtains) will be set up around the perimeter of the area to help mitigate the potential for re-suspension or release of material during the EMNR activities. The amendments will be placed in a slow and uniform manner to reduce potential resuspension of the material into the water column and promote even distribution of the amendment on the surface sediment.

In addition to the studies needed for MNR (Alternative SED-4), a pilot and/or treatability study will be necessary during the remedial design phase to determine the thickness of the amendment for the site-specific conditions. Studies to evaluate the amendment performance may include monitoring physical (e.g., placement, distribution, mixing, stability), chemical (partitioning/sorption), and biological (benthic community effects) endpoints. ICs, such as posted warning signs, would be implemented to limit recreational exposure during the EMNR period. Long-term monitoring is a component of EMNR to assess physical, chemical, and biological processes and performance to determine if contaminant concentrations are decreasing over time.

Alternative SED-6 – Capping

Estimated Capital Cost: $10,600,000 to $14,000,000
Estimated Annual O&M Cost: $6,908 to $10,225
Estimated Present Worth Cost: $10,700,000 to $14,100,000
Estimated Construction Timeframe: 13 months
Estimated Time to Achieve RAOs: 13 months

The purpose of Alternative SED-6 is to isolate the contaminated soil/sediment from receptors. The alternative consists of the following component(s):

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Cap – Surface Sediment*
- *Wetlands Mitigation Bank.*

Contaminated surface soil/sediment in the wetland would be capped with a geotextile fabric to minimize contact with contaminated soil/sediment. The cap would act as a physical barrier and would be topped with 6 inches of clean sand and a substrate containing a seed mix for revegetation of native plant species. Prior to cap placement, temporary barriers would need to be installed to dewater the wetlands. Silt and sediment control barriers (e.g., silt curtains) will be installed around the perimeter of the capping area to help mitigate the potential for re-suspension or release of contaminated soil/sediment. Trees and heavy vegetation will be cleared to provide access to the soil/sediment remediation area and to facilitate cap placement on the surface soil/sediment.

The geotextile fabric would be installed directly over the contaminated soil/sediment. The sand layer would then be placed with a telescoping belt conveyor. The use of a telescoping conveyor

would allow the even placement of the sand layer without driving heavy equipment over the geotextile fabric. Haul roads would be constructed in the dewatered wetlands to provide a stable surface for the telescoping conveyor to drive on and operate from. The roads would need to be spaced approximately 200 feet apart to accommodate the typical reach of a telescoping conveyor, which is approximately 100 feet. After the cap placement, the areas disturbed by construction activities will be fine-graded, re-seeded, and erosion controls will be installed to help prevent damage due to erosion.

Physical survey methods (bathymetric) would be performed to characterize the soil/sediment elevations prior to and following cap placement. Existing biological surveys or monitoring data for the wetland area would be evaluated, if available, to determine whether additional biological surveys or protection of sensitive species are needed prior to remediation activities. An evaluation of the soil/sediment properties (e.g., geotechnical to evaluate load bearing capacity) and hydrologic conditions would also be necessary to determine the most effective cap design. The capping of 14-acres of wetland under this alternative may result in the loss of wetland habitat, because it is uncertain whether the restored wetland area will be of the same quality prior to remediation.

Implementation of ICs would be required to limit the future disruption of the cap. Long-term monitoring would be performed to evaluate cap effectiveness and may include physical surveys of cap thickness, and collection of soil/sediment or surface water samples. The cap will require periodic O&M to remove vegetation (e.g., saplings) that may damage the cap and to identify and repair damage (e.g., due to erosion or wildlife) that may allow receptors to be exposed to the underlying contaminated sediment.

To offset the loss of wetland habitat due to capping, credits will be purchased from a permitted wetlands mitigation bank. Mitigation banks sell credits to offset negative impacts to wetlands within their designated service area. Credits would be purchased from a mitigation bank that sells credits for cypress wetlands and with a service area that includes the Site. The number of credits needed to offset a given area varies between banks and may not be 1:1.

Based on communication with a couple of local banks, the ratio of impacted wetlands (measured in acres) to credits for the wetlands at the Site would be approximately 1:2. Therefore, capping of the soil/sediment remediation area, approximately 14 acres, would require purchase of approximately 28 credits.

Alternative SED-7 – Fencing

Estimated Capital Cost: $800,000
Estimated Annual O&M Cost: $10,815
Estimated Present Worth Cost: $900,000
Estimated Construction Timeframe: 3 months
Estimated Time to Achieve RAOs: N/A

The purpose of Alternative SED-7 is to prevent human exposure to contaminated sediment by constructing a fence around the sediment. The alternative consists of the following component(s):

- *Fencing.*

Fencing would be constructed near the eastern and southern boundaries of the soil/sediment remediation areas, where Highway 97 and an unnamed road provide relatively unobstructed access to the areas. The fence will be placed outside the wetland and, to the extent possible, in areas with minimal vegetation, to reduce the amount of tree clearing needed for construction.

The area where the fence will be placed will require clearing and grubbing of vegetation and minor grading prior to fence installation. The fence would be made of chain-link, topped with barbed wire and will be eight feet tall to deter trespassers. At least one gate will be installed, near the gas-pipeline, to allow for maintenance of the ROW. Warning signs will be installed at regular spaced intervals along the fence to inform potential trespassers of the risks present at the Site. The fence will require periodic O&M to identify and repair damage.

Alternative SED-8 – Capping (Pipeline Right-of-Way Only)

Estimated Capital Cost: $3,300,000
Estimated Annual O&M Cost: $14,133
Estimated Present Worth Cost: $3,500,000
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs: 6 months

The purpose of Alternative SED-8 is to prevent exposure to contaminated soil/sediment by capping contaminated soil/sediment that is on the pipeline ROW, where COC concentrations are highest, and by constructing a fence around the contaminated soil/sediment that will not be capped. The alternative consists of the following component(s):

- *Approach C for the gas-pipeline (i.e., capping of the pipeline ROW)*
- *Fencing*
- *Wetlands Mitigation Bank.*

Contaminated surface soil/sediment in the wetland along the pipeline right-of-way would be capped with a geotextile fabric to minimize contact with contaminated soil/sediment. The cap would act as a physical barrier and would be topped with 6 inches of clean sand and a substrate containing a seed mix for revegetation of native plant species. Prior to cap placement, temporary barriers would to be installed to dewater the wetlands. Silt and sediment control barriers (e.g., silt curtains) will be installed around the perimeter of the capping area to help mitigate the potential for re-suspension or release of contaminated soil/sediment. The pipeline is periodically cleared of vegetation; however, as much vegetation as possible without endangering workers near the pipeline will be cleared to

provide access to the soil/sediment remediation area and to facilitate cap placement on the surface soil/sediment.

The geotextile fabric would be installed directly over the contaminated soil/sediment. The sand layer would then be placed with a telescoping belt conveyor. The use of a telescoping conveyor would allow the even placement of the sand layer without driving heavy equipment over the geotextile fabric. Haul roads would be constructed in the dewatered wetlands to provide a stable surface for the telescoping conveyor to drive on and operate from. The roads would need to be spaced approximately 200 feet apart to accommodate the typical reach of a telescoping conveyor, which is approximately 100 feet. After the cap placement, the areas disturbed by construction activities will be fine-graded, re-seeded, and erosion controls will be installed to help prevent damage due to erosion.

Fencing would be constructed near the eastern and southern boundaries of the soil/sediment remediation areas, where Highway 97 and an unnamed road provide relatively unobstructed access to the areas. The fence will be placed outside the wetland and, to the extent possible, in areas with minimal vegetation, to reduce the amount of tree clearing needed for construction.

The area where the fence will be placed will require clearing and grubbing of vegetation and minor grading, prior to fence installation. The fence would be made of chain-link, topped with barbed wire and will be eight feet tall, to deter trespassers. At least one gate will be installed, near the gas-pipeline, to allow for maintenance of the ROW. Warning signs will be installed at regular spaced intervals along the fence to inform potential trespassers of the risks present at the Site. The fence will require periodic O&M to identify and repair damage.

Implementation of ICs would be required to limit the future disruption of the cap. Long-term monitoring would be performed to evaluate cap effectiveness and may include physical surveys of cap thickness, and collection of soil/sediment or surface water samples. The cap will require periodic O&M, to remove vegetation (e.g., saplings) and/or repair damage (e.g., due to erosion or wildlife) that may allow receptors to be exposed to the underlying contaminated sediment. This alternative assumes this maintenance will be performed by the pipeline company, pursuant to their normal maintenance schedule.

To offset the loss of wetland habitat due to capping, credits will be purchased from a permitted wetlands mitigation bank. Mitigation banks sell credits to offset negative impacts to wetlands within their designated service area. Credits would be purchased from a mitigation bank that sells credits for cypress wetlands and with a service area that includes the Site. The amount of credits needed to offset a given area varies between banks and may not be 1:1.

Based on communication with a couple of local banks, the ratio of impacted wetlands (measured in acres) to credits for the wetlands at the Site would be approximately 1:2. Therefore, capping of the soil/sediment pipeline right-of-way remediation area (2 acres), would require purchase of approximately 4 credits.

Alternative SED-9 – Capping (Pipeline Right-of-Way and Hot Spots Only)

Estimated Capital Cost: $6,300,000
Estimated Annual O&M Cost: $14,133
Estimated Present Worth Cost: $6,500,000
Estimated Construction Timeframe: 7 months
Estimated Time to Achieve RAOs: 7 months

The purpose of Alternative SED-9 is to prevent exposure to contaminated soil/sediment by capping contaminated soil/sediment that is on the pipeline ROW and several hot spot areas, where COC concentrations are highest, and by constructing a fence around the contaminated soil/sediment that will not be capped. The alternative consists of the following component(s):

- *Approach C for the gas-pipeline (i.e., capping of the pipeline ROW)*
- *Cap – Hot Spots*
- *Fencing*
- *Wetlands Mitigation Bank.*

Contaminated surface soil/sediment in the wetland along the pipeline right-of-way and hot spots totaling approximately 3 acres in size would be capped with a geotextile fabric to minimize contact with contaminated soil/sediment. The cap would act as a physical barrier and would be topped with 6 inches of clean sand and a substrate containing a seed mix for revegetation of native plant species. Prior to cap placement, temporary barriers would to be installed to dewater the wetlands. Silt and sediment control barriers (e.g., silt curtains) will be installed around the perimeter of the capping area to help mitigate the potential for re-suspension or release of contaminated soil/sediment. The pipeline is periodically cleared of vegetation, however, as much vegetation as possible without endangering workers near the pipeline will be cleared to provide access to the soil/sediment remediation area and to facilitate cap placement on the surface soil/sediment.

The geotextile fabric would be installed directly over the contaminated soil/sediment. For the pipeline right-of-way, the sand layer would then be placed with a telescoping belt conveyor. The use of a telescoping conveyor would allow the even placement of the sand layer without driving heavy equipment over the geotextile fabric. Haul roads would be constructed in the dewatered wetlands to provide a stable surface for the telescoping conveyor to drive on and operate from. The roads would need to be spaced approximately 200 feet apart to accommodate the typical reach of a telescoping conveyor, which is approximately 100 feet. To minimize removal of vegetation and damage to the wetlands, the cap materials for the hot spots would be installed using amphibious equipment. Paths that are just large enough for the equipment would be cleared of vegetation and debris to provide access to the hot spots from the staging area. After the cap placement, the areas disturbed by construction activities will be fine-graded, re-seeded, and erosion controls will be installed to help prevent damage due to erosion.

Fencing would be constructed near the eastern and southern boundaries of the soil/sediment remediation areas, where Highway 97 and an unnamed road provide relatively unobstructed access to the areas. The fence will be placed outside the wetland and, to the extent

possible, in areas with minimal vegetation to reduce the amount of tree clearing needed for construction.

The area where the fence will be placed will require clearing and grubbing of vegetation and minor grading prior to fence installation. The fence would be made of chain-link, topped with barbed wire and will be eight feet tall to deter trespassers. At least one gate will be installed, near the gas-pipeline, to allow for maintenance of the ROW. Warning signs will be installed at regular spaced intervals along the fence to inform potential trespassers of the risks present at the Site. The fence will require periodic O&M to identify and repair damage.

Implementation of ICs would be required to limit the future disruption of the caps. Long-term monitoring would be performed to evaluate cap effectiveness and may include physical surveys of cap thickness, and collection of soil/sediment or surface water samples. The caps will require periodic O&M to remove vegetation (e.g., saplings) and/or repair damage (e.g., due to erosion or wildlife) that may allow receptors to be exposed to the underlying contaminated soil/sediment. This alternative assumes maintenance related to the pipeline right-of-way will be performed by the pipeline company pursuant to their normal maintenance schedule. Maintenance of the hot spot areas would be performed by the EPA or the State of Louisiana.

To offset the loss of wetland habitat due to capping, credits will be purchased from a permitted wetlands mitigation bank. Mitigation banks sell credits to offset negative impacts to wetlands within their designated service area. Credits would be purchased from a mitigation bank that sells credits for cypress wetlands and with a service area that includes the Site. The amount of credits needed to offset a given area varies between banks and may not be 1:1.

Based on communication with a couple of local banks, the ratio of impacted wetlands (measured in acres) to credits for the wetlands at the Site would be approximately 1:2. Therefore, capping of the soil/sediment pipeline right-of-way and hot spot remediation areas (5 acres total), would require purchase of approximately 10 credits.

Soil Alternatives

The estimated remediation quantities of the surface soil and subsurface soil remediation areas, collectively referred to as the soil remediation area, are as follows:

Surface Soil

- The size of the area is approximately 27,000 square yards (6 acres).
- The depth of excavation is 2 feet.
- The volume is approximately 18,000 in-place cubic yards.
- The area and volume do not include surface soil that overlies contaminated subsurface soil. Surface soil overlying contaminated subsurface soil is included with the subsurface

soil quantities on the list that follows.

Subsurface Soil

- The size of the area is approximately 9,930 square yards (2 acres).
- The depth of excavation is 15 feet.
- The volume is approximately 50,000 in-place cubic yards.

The following subsections describe the alternatives for the soil remediation area.

Alternative SOIL-1 – No Further Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction Timeframe: N/A
Estimated Time to Achieve RAOs: N/A

Section 300.430 (e)(6) of the NCP requires the inclusion of a no action alternative in the RI/FS, or a no further action alternative if an interim or final action is already underway, for use as a baseline to compare against other alternatives. Under this alternative, no remedial actions will be conducted at the Site. All contaminants will remain in place and will be subject to environmental influences. Furthermore, no action will be taken to prevent unauthorized access or development at the Site. No ICs to inform interested parties regarding Site conditions will be implemented.

Alternative SOIL-2-1 and 2-2: Excavation

SOIL 2-1
Estimated Capital Cost: $78,600,000 - $95,100,000
Estimated Annual O&M Cost: $24,000 - $$65,100
Estimated Present Worth Cost: $78,600,000 - $95,100,000
Estimated Construction Timeframe: 8 to 11 months
Estimated Time to Achieve RAOs: 8 to 11 months

SOIL 2-2
Estimated Capital Cost: $11,600,000 to $16,300,000
Estimated Annual O&M Cost: $82,275 to 85,593
Estimated Present Worth Cost: $12,600,000 to $17,300,000
Estimated Construction Timeframe: 8 to 11 months
Estimated Time to Achieve RAOs: 8 to 11 months

The purpose of Alternatives SOIL-2-1 and SOIL-2-2 is to excavate surface and subsurface soil from the soil remediation area. Alternative SOIL-2-1 requires disposal of the excavated soil at an off-site hazardous waste landfill (i.e., a RCRA Subtitle C landfill). Alternative SOIL-2-2 requires consolidation of the excavated soil on-site in a constructed containment cell. The alternatives consist of the following components:

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Excavation – Surface Soil*
- *Excavation – Subsurface Soil*
- *Off-site Disposal* (Alternative SOIL 2-1 only), or *Consolidation in an On-site Containment Cell* (Alternative SOIL 2-2 only).

Excavation – Surface Soil
Prior to removal of the soil, trees and heavy vegetation will be cleared to provide access to the surface soil remediation area. Stumps and root balls with impacted soil will be segregated for disposal at the same facility but in separate loads. Surface soil will then be removed by conventional excavation equipment (e.g., bulldozer or excavator) and loaded onto conventional highway dump trucks. The soil around the soil remediation area is stable and close to a paved highway (i.e., LA Hwy 97). Therefore, access and haul roads are not expected to be needed to provide the dump trucks access to the highway.

Excavated areas will be backfilled to within 6 inches of the original grade with clayey soil, to match the native soil type. The clayey soil will be obtained from an off-site source. Six inches of topsoil, also obtained from an off-site source, will be placed over the clayey soil, and then restoration activities will take place. Restoration activities will consist of the installation of erosion controls, fine grading, and re-seeding in the excavation areas and in areas disturbed during construction.

Excavation – Subsurface Soil
The subsurface soil remediation area is not heavily vegetated and thus will only require minor clearing of vegetation to provide access to the area. Removal of subsurface soil will require excavation to depths of up to 15 feet bgs. Excavation to those depths can be accomplished with conventional excavation equipment (e.g., excavators, front-end loaders, and bulldozers). Protective systems (e.g., shoring, benching, or sloping) are required by 29 CFR §1926 Subpart P for excavations greater than 5 feet bgs, to protect construction workers from cave-ins.

Excavated areas will be backfilled to within six inches of the original grade with clayey soil, to match the native soil type. The clayey soil will be obtained from an off-site source. Six inches of topsoil, also obtained from an off-site source, will be placed over the clayey soil and then restoration activities will take place. Restoration activities will consist of the installation of erosion controls, fine grading, and re-seeding in the excavation areas and in areas disturbed during construction.

Delineation samples before the remedial action begins will be obtained for further refinement of the subsurface soil remediation areas.

Off-Site Disposal
The excavated soil will be hauled off-site to a facility for treatment, if necessary, followed by disposal in a RCRA Subtitle C landfill. Samples will be collected prior to disposal to help profile the soil (e.g., for testing via the Toxicity Characteristic Leaching Procedure and the Paint Filter Liquids Test). The hazardous waste codes F032, F034, and F035 are anticipated to apply to wastes originating from the Site. Based on the soil analytical results from the RI, incineration was assumed to be the treatment technology required prior to disposal.

Consolidation in an On-Site Containment Cell
This component is identical to the *Consolidation in an On-site Containment Cell* component described in Alternative SED-3 above.

Alternative SOIL-3-1 through 3-4: Excavation (surface soil only) and Capping

SOIL 3-1
Estimated Capital Cost: $31,300,000 to $36,700,000
Estimated Annual O&M Cost: $85,700 to $127,000
Estimated Present Worth Cost: $31,400,000 to $36,800,000
Estimated Construction Timeframe: 5 to 8 months
Estimated Time to Achieve RAOs: 5 to 8 months

SOIL 3-2
Estimated Capital Cost: $34,400,000 to $40,400,000
Estimated Annual O&M Cost: $13,850 to $17,167
Estimated Present Worth Cost: $34,600,000 to $40,600,000
Estimated Construction Timeframe: 4 to 6 months
Estimated Time to Achieve RAOs: 4 to 6 months

SOIL 3-3
Estimated Capital Cost: $5,010,000 to $8,190,000
Estimated Annual O&M Cost: $87,251 to $90,569
Estimated Present Worth Cost: $6,090,000 to $9,270,000
Estimated Construction Timeframe: 5 to 8 months
Estimated Time to Achieve RAOs: 5 to 8 months

SOIL 3-4
Estimated Capital Cost: $14,300,000 to $19,500,000
Estimated Annual O&M Cost: $94,193 to $97,511
Estimated Present Worth Cost: $15,500,000 to $20,700,000
Estimated Construction Timeframe: 4 to 6 months
Estimated Time to Achieve RAOs: 4 to 6 months

The purpose of Alternatives SOIL-3-1 through 3-4 is to excavate the surface soil and to place a cap over subsurface soil in the soil remediation area. The cap for Alternatives SOIL-3-1 and 3-3

consists of the clean backfill that will replace the excavated surface soil, since the subsurface soil remediation area is entirely within the surface soil remediation area. The cap for Alternatives SOIL-3-2 and 3-4 also consists of the clean fill that will replace excavated surface soil, except the cap will cover subsurface soil that has been treated via in-situ S/S. Excavated soil will either be hauled to an off-site hazardous waste landfill for disposal or consolidated on-site in a constructed containment cell. The alternatives consist of the following components:

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Excavation – Surface Soil*
- *Cap – Subsurface Soil* (Alternative SOIL 3-1 and 3-3 only), or
In-Situ Solidification/Stabilization (Alternative SOIL 3-2 and 3-4 only)
- *Off-site Disposal* (Alternative SOIL 3-1 and 3-2 only), or
Consolidation in an On-site Containment Cell (Alternative SOIL 3-3 and 3-4 only).

Since these alternatives assume all surface soil, including surface soil co-located with subsurface soil, will be excavated, the estimated remediation quantities presented at the beginning of Soil Alternatives Section must be adjusted as follows:

Surface Soil

- The size of the area is approximately 37,000 square yards (8 acres).
- The depth of excavation is 2 feet.
- The volume is approximately 25,000 in-place cubic yards.
- The area and volume include surface soil that is co-located with subsurface soil.

Subsurface Soil

- The size of the area is approximately 9,930 square yards (2 acres).
- The depth of contaminated soil is 13 feet, after surface soil has been removed.
- The volume is approximately 43,000 in-place cubic yards.

Cap – Subsurface Soil

There is no existing direct exposure pathway to contaminated subsurface soil. Once the contaminated surface soil is removed and replaced with clean backfill, the contaminated subsurface soil will be effectively capped, since the clean surface soil will provide a barrier between receptors and contaminants. A warning layer, consisting of high-visibility geotextile fabric, will be installed between the clean backfill and contaminated subsurface soil to alert people that attempt to excavate in this area. Due to its location within the floodplain and in an area susceptible to tropical storms, the cap will need to be designed to withstand frequent flooding (e.g., may include turf reinforcement matting, check dams, etc.). Since surface soil is defined as the top two feet of soil, the cap will have thicknesses of 2 feet.

The cap will require periodic O&M inspections to identify and repair erosion or other damage that may allow receptors to be exposed to the underlying contaminated subsurface soil. Maintenance of the cap will be performed, following the inspections, and will include repair of any damage that may have occurred to the cap.

In-Situ Solidification/Stabilization

In-situ S/S generally consists of the creation of a reagent slurry, blending of the reagent slurry with the contaminated soil in-place and curing of the treated soil. The reagent slurry is created in a batch plant assembled near the treatment areas (e.g., at the staging area). The batch plant is typically composed of silos, to store unused reagents and the reagent slurry; a mixing vessel; and other support equipment (e.g., pumps). The reagent slurry is transferred from the batch plant to the mixing equipment. The mixing equipment needed to treat soil to a depth of up to 15 feet bgs is typically an auger mounted to either an excavator or a crane. The excavator-mounted, or crane-mounted, auger treats columns of soil by rotating the auger to mix the soil in-place while the reagent slurry is injected through ports on the auger into the soil. Treated soil columns are allowed to cure, to develop the physical and chemical properties that will ultimately reduce the mobility of contaminants. Quality control samples of the treated soil are collected periodically during mixing and evaluated for common performance parameters (e.g., slump and compressive strength). Treatment is complete when the entire remediation area has been mixed with the reagent slurry and allowed to cure. The treated soil remains in-place after treatment.

For remedial alternatives SOIL-3-1 through SOIL 3-4, the surface soil will be removed and, therefore, only the subsurface soil will be treated. High-visibility geotextile fabric will be installed between the subsurface soil (i.e., untreated or treated by In-Situ S/S) and the clean backfill that will replace the surface soil to alert people that attempt to excavate in this area. The geotextile fabric and clean backfill will effectively cap the untreated (SOIL 3-1 and SOIL 3-3) or treated subsurface soil (SOIL 3-2 and SOIL 3-4).

The volume of the soil will increase (i.e., swell) because of treatment by S/S. A portion of the treated soil will not fit within the treatment area, due to the increase in volume, and will need to be addressed. The swell will be mounded and compacted over the treated areas, before they are capped, to help prevent water from ponding over them. The caps described in the two preceding paragraphs will cover the swell material, in addition to the rest of the treated soil.

A treatability study concluded that a reagent mixture of 5% (by wet soil weight) type I Portland cement, 7.5% ground granulated blast-furnace slag (grade 120), 2% organoclay, and 2.5% incinerator ash would meet strength and hydraulic conductivity performance criteria and would reduce the leaching potential of indicator COCs in subsurface soil. The swell for the mixture was estimated to be between 25 and 55%, by volume; the average of the two, 40%, was used to determine the volume of soil that will have to be mounded on-site over the treatment areas. Due to the high clay content of the soil, mixing of the soil and reagents is expected to take longer and require more energy than sandier soils, but is still considered implementable by currently available soil mixing methods.

The capped treated soil will require periodic O&M to identify and repair erosion or other damage to the cap that may allow receptors to be exposed to the underlying treated soil.

Alternative SOIL 4-1 and 4-2: Capping

SOIL 4-1
Estimated Capital Cost: $1,410,000 to $4,220,000
Estimated Annual O&M Cost: $6,908 to $10,225
Estimated Present Worth Cost: $1,500,000 to $4,310,000
Estimated Construction Timeframe: 3 to 5 months
Estimated Time to Achieve RAOs: 3 to 5 months

SOIL 4-2
Estimated Capital Cost: $13,300,000 to $18,800,000
Estimated Annual O&M Cost: $13,850 to $17,167
Estimated Present Worth Cost: $13,500,000 to $19,000,000
Estimated Construction Timeframe: 6 to 9 months
Estimated Time to Achieve RAOs: 6 to 9 months

The purpose of Alternatives SOIL-4-1 and 4-2 is to place a cap over the soil remediation area. Alternative SOIL-4-1 requires the placement of a cap directly over the soil, thereby capping both surface and subsurface soil. Alternative SOIL-4-2 requires treatment of subsurface soil via in-situ S/S, including surface soil that is co-located with the subsurface soil, and the placement of a cap over the treated soil columns and rest of the soil remediation area. The alternatives consist of the following components:

- *One of the three approaches to the gas-pipeline (i.e., Approach A, B, or C)*
- *Cap – Surface Soil*
- Cap – Subsurface Soil (Alternative SOIL 4-1 only), or

In-Situ Solidification/Stabilization (Alternative SOIL 4-2 only).

Cap – Surface Soil
Prior to placement of the cap, trees and heavy vegetation will be cleared to provide access to the surface soil remediation area. A layer of high-visibility geotextile fabric will be installed over the surface soil to alert people that attempt to excavate in this area. Clean clayey soil, to match the native soil type, will be obtained from an off-site source and will be spread over the geotextile fabric to form a 1.5-foot thick layer. Six inches of topsoil, also obtained from an off-site source, will be placed over the clayey soil, resulting in a cap thickness of 2 feet. After the topsoil is placed, the cap, and areas disturbed by construction activities, will be fine-graded, reseeded, and erosion controls will be installed to help prevent damage due to erosion.

Due to its location within the floodplain and in an area susceptible to tropical storms, the cap will need to be designed to withstand frequent flooding (e.g., may include turf reinforcement matting, check dams, etc.). The cap will require periodic O&M inspections to identify and repair erosion or other damage that may allow receptors to be exposed to the underlying contaminated soil.

Maintenance of the cap will be performed following the inspections and will include repair of any damage that may have occurred to the cap.

For remedial alternative SOIL 4-2, this component assumes surface soil and subsurface soil in the remediation area will be treated, such that a treated soil column will consist of soil between 0 and 15 feet bgs. In this case, 2 feet of clean soil will be placed above the treated soil columns to form a cap. High-visibility geotextile fabric will be installed between the clean soil and the treated soil to alert people that attempt to excavate in this area.

17.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine criteria required by 40 CFR § 300.430(e) of the NCP are used to evaluate the different remediation alternatives, individually and against each other in order to select a remedy. Threshold criteria are requirements that each alternative must meet to be eligible for selection and involve Overall Protection and Human Health and the Environment and Compliance with ARARs (ARAR's can be found in Table 8). Primary balancing criteria are used to weigh major trade-offs among alternatives and involve Long Term Effectiveness and Permanence, Reduction of Toxicity, Mobility, and Volume through Treatment, Short-term Effectiveness, Implementability, and Cost. Two criteria, called Modifying criteria – State Acceptance and Community Acceptance – are fully assessed after comments are obtained on the Proposed Plan and Administrative Record and are fully addressed in this Record of Decision. Modifying criteria are of equal importance to the balancing criteria. This section of the ROD profiles the relative performance of each alternative against seven of the nine criteria (Tables 6 and 7), except for State Acceptance and Community Acceptance which are addressed in Part 3 of this ROD, noting how it compares to the other options under consideration.

Alternatives SED-1, SED-7, and SOIL-1 were not carried forward in this section since they do not meet the threshold criteria of Overall Protection of Human Health. In addition, Alternatives SED-4 and SED-5 were not carried forward in this section since a significant amount of information is still required to determine if these alternatives are viable. Therefore, Alternatives SED-1, SED-7, SOIL-1, SED-4, and SED-5 are only presented in this ROD for informational purposes.

Overall Protection of Human Health and the Environment

Sediment (Swamp Soil) Alternatives
Alternative SED-1 – No, does not protect human health and the environment
Alternative SED-2 – Yes, protects human health and the environment
Alternative SED-3 – Yes, protects human health and the environment
Alternative SED-4 – Yes, protects human health and the environment
Alternative SED-5 – Yes, protects human health and the environment
Alternative SED-6 – Yes, protects human health and the environment
Alternative SED-7 – No, does not protect human health and the environment
Alternative SED-8 – Yes, protects human health and the environment
Alternative SED-9 – Yes, protects human health and the environment

The active sediment (swamp soil) remedial alternatives, except the no further action alternative (i.e., Alternative SED-1), were designed to be protective of human health and the environment by reducing exposure to contaminated media. The active sediment Alternatives SED-2 and SED-3 both reduce exposure by removing the contaminated sediment from the Site and either disposing of it at an off-site facility or consolidating it in an on-site containment cell. Overall, disposal at an off-site facility will provide better protection for human health and the environment. Consolidation of material on-site leaves the contaminated media in a containment cell and relies on ICs to limit access. Additionally, long-term O&M will be required with an on-site cell.

The active sediment Alternative SED-6 will help to prevent exposure to the contaminated sediment by physically isolating the contamination by capping. However, the contaminated sediment will remain on-site and relies on ICs and long-term O&M to maintain the cap integrity. Alternatives SED-8 and SED-9 also prevent exposure by capping, but they only address the hot spot areas of contaminated sediment (i.e., the portion with the highest concentrations). Fencing would limit access to the portion of the contaminated sediment that would remain on-site. Alternative SED-9 provides better protection for human health and the environment than Alternative SED-8, because it includes capping of a larger area of contaminated sediment.

Alternative SED-7 relies on fencing and ICs to limit exposure of human receptors to contaminated sediment. However, no actions are taken to reduce risks to ecological receptors and, therefore, Alternative SED-7 is not considered to be protective of the environment.

The three options considered for the pipeline include A: Reroute, B: Work Around, and C: Cap. Approach A provides the best overall protection of human health and the environment, as all media within the area identified for remediation would be addressed. Approach C would provide the next best option for the pipeline. However, long-term O&M would be required to maintain the cap. Approach B, work around the pipeline, ranks lowest for overall protection of human health and the environment, since impacted material will remain in the pipeline ROW.

The no further action alternative, for all media types, does not ensure protection of human health or the environment because current Site conditions will not be addressed, and the risk assessment indicates there is a potential for unacceptable risk in that scenario.

Soil Alternatives

Alternative SOIL-1 – No, does not protect human health and the environment
Alternative SOIL 2-1 – Yes, protects human health and the environment
Alternative SOIL 2-2 – Yes, protects human health and the environment
Alternative SOIL 3-1 – Yes, protects human health and the environment
Alternative SOIL 3-2 – Yes, protects human health and the environment
Alternative SOIL 3-3 – Yes, protects human health and the environment
Alternative SOIL 3-4 – Yes, protects human health and the environment
Alternative SOIL 4-1 – Yes, protects human health and the environment
Alternative SOIL 4-2 – Yes, protects human health and the environment

The soil remedial alternatives, except the no further action alternative, the in-situ S/S alternatives, and capping alternatives, were designed to be protective of human health by removing contaminated soil and disposing of it in an off-site landfill or consolidating it in an on-site containment cell. The containment cell alternatives are considered less protective for the same reason as the containment cell alternatives for sediment (previous section). Alternatives with in-situ S/S treat subsurface soil, leave the subsurface soil in-place, and place a soil barrier over the treated soil. Alternatives with capping place a soil barrier over impacted soil. In both cases, the alternatives rely on ICs to limit access to contaminants left on-site. However, with the capped or treated and capped alternatives, soil remains underground where it is less prone to flood damage and is, therefore, considered more protective than the containment cell alternatives but less protective than the alternatives that dispose of the soil at an off-site location.

The three options considered for the pipeline include A: Reroute, B: Work Around, and C: Cap. Approach A provides the best overall protection of human health and the environment, as all media within the area identified for remediation would be addressed. Approach C would provide the next best option for the pipeline. However, long-term O&M would be required to maintain the cap. Approach B, work around the pipeline, ranks lowest for overall protection of human health and the environment since impacted material will remain in the pipeline ROW.

The no further action alternative, for all media types, does not ensure protection of human health or the environment because the current Site conditions will not be addressed, and the risk assessment indicates there is a potential for unacceptable risk in that scenario.

Compliance with ARARs

Sediment (Swamp Soil) Alternatives

Alternative SED-1 – No, does not comply with ARARs
Alternative SED-2 – Yes, complies with ARARs
Alternative SED-3 – Yes, complies with ARARs
Alternative SED-4 – Yes, complies with ARARs
Alternative SED-5 – Yes, complies with ARARs
Alternative SED-6 – Yes, complies with ARARs
Alternative SED-7 – Yes, complies with ARARs
Alternative SED-8 – Yes, complies with ARARs
Alternative SED-9 – Yes, complies with ARARs

Soil Alternatives

Alternative SOIL-1 – No, does not comply with ARARs
Alternative SOIL 2-1 – Yes, complies with ARARs
Alternative SOIL 2-2 – Yes, complies with ARARs
Alternative SOIL 3-1 – Yes, complies with ARARs
Alternative SOIL 3-2 – Yes, complies with ARARs
Alternative SOIL 3-3 – Yes, complies with ARARs
Alternative SOIL 3-4 – Yes, complies with ARARs

Alternative SOIL 4-1 – Yes, complies with ARARs
Alternative SOIL 4-2 – Yes, complies with ARARs

The no further action alternatives for all media types do not comply with ARARs. Contaminants will remain on-site at concentrations that exceed EPA Regional Screening Levels. The remaining alternatives comply with all ARARs in Table 8.

The alternatives with in-situ S/S, a containment cell, or capping components (i.e., Alternatives SOIL-2-2, SOIL-3-1 through SOIL-3-4, SOIL-4-1, SOIL-4-2, SED-3, SED-6, SED-8, and SED-9) require hydrologic modeling to demonstrate that the placement of a cell, cap, or the mounding of swell material over treated areas will not adversely affect base flood elevations. For remedy selection purposes, it is assumed they will not raise the base flood elevation above the required threshold and, therefore, will comply with ARARs. If hydrologic modeling demonstrates that base flood elevations will be adversely affected by the alternatives, then their design may need to be altered to minimize the increase in flood elevations (e.g., a portion of the swell can be disposed off-site). The remaining sediment and soil remedial alternatives (SOIL 2-1, SED-2, and SED-7) that were developed will comply with ARARs at the completion of the remedial activities.

Sediment alternatives SED-2 and SED-3 adequately meet the ARARs associated with wetlands but will damage a fair amount of the wetlands area. Out of the remaining alternatives SED-6, SDE-8, and SED-9, which involve wetland destruction or placement of fill, alternative SED-8 is best at meeting the ARARs since it provides for the minimal amount of damage to and placement of fill in the wetlands area.

Long-Term Effectiveness and Permanence

The balancing criterion of long-term effectiveness and permanence considers: (1) the magnitude of residual risk from untreated waste or treatment residuals remaining at the conclusion of the remedial activities, and (2) the adequacy and reliability of controls such as containment systems and ICs that are necessary to manage treatment residuals and untreated waste.

The alternatives that include excavation and off-site disposal of contaminated sediment and soil (i.e., Alternatives SED-2 and SOIL-2-1) are the most effective alternatives in the long-term, because they permanently remove contaminants from the Site. The alternatives that include in-situ S/S, treatment by sorbent amendments (EMNR), capping, and consolidation in an on-site containment cell (i.e., Alternatives SED-3, SED-5, SED-6, SED-8, SED-9, SOIL-2-2, SOIL-3-1 through SOIL-3-4, SOIL-4-1, and SOIL-4-2) are less effective than the off-site disposal alternatives in the long-term, because contaminated soil and sediment will remain in-place, though they will be capped, treated, and/or consolidated in a cell to reduce exposure to receptors. The capped, treated, and/or consolidated material will be located within the 100-year floodplain, where it will be susceptible to damage due to flooding. These alternatives will need ICs and long-term O&M and monitoring to ensure that the remedy continues to be effective. Of these alternatives, the two alternatives that cap only a portion (hot spot areas) of the contaminated sediment (i.e., Alternatives SED-8 and SED-9), are considered less effective than the rest.

Rerouting the pipeline (Approach A) is the most effective long-term option, as all areas identified as requiring remediation would be addressed. Capping the pipeline (Approach C) also is an option that reduces exposure to receptors, however, it leaves contamination in place that could be exposed if maintenance is not performed (e.g., damage from wildlife or floodwaters). Approach B would result in leaving impacted material over the pipeline which would leave the potential for future pipeline maintenance workers and adolescent recreational users to be exposed to this material. Furthermore, pipeline workers would need to be aware of the contamination in Approaches B and C and take appropriate precautions in the event pipeline maintenance is required.

Reduction of Toxicity, Mobility, or Volume through Treatment

This balancing criterion assesses the degree to which an alternative employs recycling or treatment to reduce the toxicity, mobility, or volume of contaminants.

The alternatives that include off-site disposal (i.e., Alternatives SED-2, SOIL-2-1) provide the greatest reduction in toxicity, mobility, and volume of contaminants. The soil and sediment will be treated, if necessary, to meet the RCRA LDR treatment standards, which will decrease the toxicity, mobility, and volume of contaminated media. Then, they will be placed in an off-site landfill, which will further reduce the mobility of the contaminants.

The in-situ S/S alternatives for soil (i.e., Alternatives SOIL-3-2, SOIL-3-4, SOIL-4-2) provide a lesser reduction in mobility and toxicity than the off-site treatment and disposal alternatives and do not reduce the volume of contaminated soil. The contaminated soil remains on-site, encapsulated within the treatment area, but the treatment is considered irreversible.

The containment cell and capping alternatives (i.e., Alternatives SED-3, SED-6, SED-8, SED-9, SOIL-2-2, SOIL-3-1 through SOIL-3-4, SOIL-4-1, and SOIL-4-2) also provide a lesser reduction in mobility than the off-site treatment and disposal alternatives, but they do not include irreversible treatment to reduce the toxicity or volume of contaminated media. Alternatives SED-8 and SED-9 would only cap a limited portion (hot spot areas) of the sediment remediation area and, therefore, provide a lesser reduction in mobility than Alternatives SED-3 and SED-6, which address the entire sediment remediation area.

Rerouting the pipeline (Approach A) provides the highest reduction of toxicity and mobility, as all areas identified as requiring remediation would be addressed. Approaches B and C, working around pipeline and capping, will not reduce toxicity or volume of material in the pipeline ROW. Capping will reduce mobility of material in the ROW.

Short-Term Effectiveness

This balancing criterion considers the following: (1) Short-term risks that might be posed to the community during implementation of an alternative; (2) Potential impacts on workers during remedial action and the effectiveness/reliability of protective measures; (3) Potential environmental

impacts of the remedial action and the effectiveness/reliability of mitigation measures during implementation; and (4) Time until protection is achieved.

Sediment Alternatives

The capping alternatives (SED-6, SED-8, and SED-9) involve construction activities for placement of the cap on the sediment in place. For this reason, they would cause less impact to the community compared to the sediment removal alternatives (Alternative SED-2 and SED-3) that include transport of large quantities of excavated hazardous material to an on-site containment cell or off-site landfill for disposal. They also cause a lesser impact to the environment because they either are not expected to significantly degrade the wetlands, or the impact is offset through the purchase of credits from a wetlands mitigation bank. The sediment removal alternatives restore the wetlands by backfilling excavated areas and planting saplings; however, the saplings are expected to take a long time (on the order of 200 years) to grow to the size of the trees they are replacing.

Alternatives SED-8 and SED-9 require capping of limited areas and, thus, are rated highest in short-term effectiveness. Trees and vegetation within the sediment remediation area would be cleared to place the cap materials that are part of Alternative SED-6 (capping of the entire remediation area), and thus, SED-6 would be rated lower in short-term effectiveness than SED-8 and SED-9. The on-site containment cell alternative (i.e., Alternative SED-3) would create less short-term impacts compared to off-site disposal (Alternative SED-2) because the on-site containment cell alternative will transport contaminated sediment a short distance for disposal relative to the off-site landfill. The shorter transport distance is expected to produce less pollution due to vehicle emissions and is safer to the general public because there is less potential exposure. However, the on-site containment cell will require the transport of a large volume of sediment across LA Hwy 97; the increase in traffic across the highway is expected to pose an increased risk of exposure to the local community.

Further, the containment cell alternative does not have a treatment component. The other sediment alternative (i.e., Alternative SED-2), has an off-site disposal component that will likely require incineration. The lack of treatment makes the containment cell alternative a less energy intensive alternative (i.e., more sustainable) than Alternative SED-2 and, therefore, more effective in the short-term. The sediment alternative with an off-site disposal component (i.e., Alternative SED-2) is considered the least effective sediment alternative in the short-term. It is expected to have elevated vehicle emissions due to the off-site transportation of sediment, will pose greater exposure risks to the local community due to off-site transportation of contaminated media, and will be more energy-intensive due to the usage of incineration for treatment. For reference, the nearest incinerator to the Site is in Port Arthur, Texas (approximately 120 miles away).

Soil Alternatives

The capping alternatives (i.e., Alternatives SOIL-4-1 and SOIL-4-2) are the most effective in the short-term. These alternatives require the least amount of earthwork and thus pose less risks to workers and would have low vehicle emissions relative to other alternatives. Capping

alternatives also do not require the transport of contaminated soil, making them less likely to result in exposure of workers and the local community to Site contaminants.

The on-site containment cell alternatives (i.e., Alternatives SOIL-2-2, SOIL-3-3, SOIL-3-4) are moderately effective in the short-term. These alternatives do not have off-site disposal components and, thus, do not have the high vehicle emissions or the same possibility of a hazardous waste spill that the alternatives with an off-site disposal component have. However, the on-site containment cell alternatives still require substantial earthwork and will require the transportation of a large volume of contaminated soil across LA Hwy 97 to the proposed containment cell location. Therefore, the on-site containment cell alternatives can be considered less effective than the capping alternatives.

The off-site treatment and disposal alternatives (i.e., Alternatives SOIL-2-1, SOIL-3-1, SOIL-3-2) are ranked less effective than the on-site containment cell and capping alternatives. The off-site treatment and disposal alternatives will have the higher vehicle emissions and safety concerns mentioned in the previous paragraph due to their need to transport excavated soil to an off-site location. They will also likely require incineration as a treatment technology and, therefore, will be more energy-intensive than the on-site containment cell and capping alternatives.

Pipeline Approaches

Rerouting the pipeline (Approach A) is the least desirable short-term effectiveness option due to the additional work required to reroute the pipeline (e.g., clearing of vegetation for new pipeline path and connecting the new pipeline to the existing line). Approach C, capping, also increases risks to workers since the work would be performed over an active gas pipeline. Approach B is the highest short-term effectiveness option since it does not require additional work and does not require substantial work over an active pipeline.

Implementability

This balancing criterion considers the ease or difficulty of implementing an alternative.

Sediment Alternatives

The no action alternative (i.e., Alternative SED-1) is the most implementable alternative. The capping alternatives (i.e., Alternatives SED-6, SED-8, and SED-9) are the next most implementable alternatives. The alternatives that only require capping of a limited area (i.e., Alternatives SED-8 and SED-9) are more implementable than Alternative SED-6, due to their significantly smaller construction footprint, with Alternative SED-8 being the most implementable since it has the smallest construction footprint.

The off-site disposal alternative (i.e., Alternative SED-2) is the next most implementable alternative. The approvals and coordination required with government agencies for this alternative is typical of heavy construction and are not expected to be difficult to execute.

Since the contaminated sediment will be hauled off-site for disposal, no long-term O&M or long-term monitoring is needed. However, the risk of exposure to Site contaminants is higher for the local community for this alternative, because contaminated soil will be transported on public roads for extended periods of time. The on-site containment cell alternative (i.e., Alternative SED-3) is the least implementable sediment alternative. Coordination with the floodplain administrator will be required to get approval to build the containment cell within the 100-year floodplain. Since contaminated sediment will remain on-site, this alternative will need long-term O&M and monitoring to ensure the cell continues to function as intended.

Soil Alternatives

With exception to the no action alternative (i.e., Alternatives SOIL-1), the most implementable alternative is the excavation and off-site treatment and disposal alternative (i.e., Alternative SOIL-2-1). This alternative requires conventional excavation methods; therefore, the equipment and skilled labor are expected to be readily available; and does not have long-term monitoring or O&M requirements.

The capping alternatives are considered less implementable than the off-site treatment and disposal alternatives. Capping does not require specialized equipment; therefore, the equipment and skilled labor are expected to be readily available. Since the cap will be placed within the 100-year floodplain, these alternatives will require approval from the floodplain administrator be built. These alternatives have a relatively minor long-term O&M component to maintain the integrity of the cap.

The containment cell alternatives are considered less implementable than the capping alternatives. The containment cell will be larger in size, relative to the cap, and, therefore, will be less likely to obtain approval to be built within the 100-year floodplain. Soil will need to be transported across LA Hwy 97 to be placed in the cell. Transportation across the highway will require careful planning to avoid increasing local traffic and the likelihood of accidents, though the risk is less than for off-site disposal alternatives, which will transport soil longer distances. The containment cell will require long-term monitoring and will have a substantial O&M component, due to the need to maintain the cell (e.g., mow, check for erosion and subsidence, and dispose of leachate). However, the equipment required to build a containment cell is common of heavy construction work and readily available.

The no action alternative (i.e., Alternative SOIL-1) is the most implementable alternative.

Pipeline Approaches

Rerouting the pipeline (Approach A) will likely require special certifications (e.g., U.S. Department of Transportation Operator Qualification), the acquisition of ROWs for the new pipeline segment, close coordination with the pipeline company, and will require pipeline construction in a wetland environment, thus making it the least implementable pipeline approach. Approaches B and C (work around pipeline and cap pipeline, respectively) are more implementable than Approach A and are similarly implementable relative to each other, because both are not expected to need specialized workers, are technically feasible, and generally do not

have as many obstacles for implementation compared to Approach A (e.g., the acquisition of ROWs). Approach B is slightly more implementable than Approach C because Approach C will need long-term O&M to maintain the cap while Approach B does not include construction of a cap and, thus, does not have a long-term O&M component.

Cost

The remedial action alternative cost estimates are based on the best available data and are expected to have a degree of accuracy of -30% to +50%, pursuant to EPA guidance. The remedial action alternative cost estimated include allowances for the following:

Common elements
Pipeline Approaches – A, B, or C
Capital costs – this includes costs for construction of the key technology components
Annual O&M costs – this includes costs for operation of the key technology components
Periodic costs – this includes costs for items like five-year reviews, maintenance and enforcement of ICs, and equipment replacement.

The total present worth cost for the alternatives is estimated as follows:

Sediment (Swamp Soil) Alternatives

Alternative SED-1 – No Further Action: $0
Alternative SED-2 – Alternative SED-2 – Mechanical Excavation, Dewatering, and Off-Site Disposal: $68,200,000 to $76,600,000
Alternative SED-3 – Mechanical Excavation, Dewatering, and Consolidation in an On-Site Containment Cell: $26,700,000 to $30,700,000
Alternative SED-6 – Capping: $10,700,000 to $14,100,000

Alternative SED-8 – Capping (Pipeline Right-of-Way Only): $3,500,000

Alternative SED-9 – Capping (Pipeline Right-of-Way and Hot Spots Only): $6,500,000

Soil Alternatives

Alternative SOIL-1 – No Further Action: $0

Alternative SOIL-2-1 and 2-2: Excavation

SOIL 2-1 - $78,600,000 to $95,100,000

SOIL 2-2 - $12,600,000 to $17,300,000

Alternative SOIL-3-1 through 3-4: Excavation (surface soil only) and Capping

SOIL 3-1 - $31,400,000 to $36,800,000

SOIL 3-2 - $34,600,000 to $40,600,000

SOIL 3-3 - $6,090,000 to $9,270,000

SOIL 3-4 - $15,500,000 to $20,700,000

Alternative SOIL 4-1 and 4-2: Capping

SOIL 4-1 - $1,500,000 to $4,310,000

SOIL 4-2 - $13,500,000 to $19,000,000

Selection of the remedial alternative is not solely based on cost. However, cost can be used to select between alternatives that perform favorably, when comparing the other criteria.

A comparison of all the sediment and soil alternatives is illustrated in Tables 6 and 7, respectively.

Combining the least costly and the costliest alternatives for sediment and soil would result in a remedy ranging from approximately $2.5 million to $171 million. The costs, from most to least expensive, for the sediment and soil alternatives are described below.

For sediment alternatives, the alternative that includes excavation and off-site disposal of sediment is the most expensive, due to their high disposal costs and ranges from $68 million to $76 million, depending upon the pipeline scenario implemented. The next lower cost sediment alternative is the excavation/on-site disposal alternative, which ranges from $27 million to $30 million, depending upon the pipeline scenario implemented. Capping all the contaminated sediment would be the next lower cost alternative at $10 million to $14 million, depending upon the pipeline scenario implemented. At $6.5 million and $3.5 million, the Fencing/Capping Hot Spots and the Fencing/Capping Pipeline Right-of-Way alternatives, respectively, would be the least costly alternatives.

For soil alternatives, the alternative that includes excavation and off-site disposal of soil is the most expensive, due to their high disposal costs and ranges from $78 million to $95 million, depending upon the pipeline scenario implemented. The next three lower cost soil alternatives are alternatives that involve excavation of surface soil, with either off-site or on-site containment cell disposal and either capping or implementing in-situ stabilization/solidification for subsurface soils. Excavation, off-site disposal, and in-situ stabilization/solidification (subsurface) would range from $34 million to $40 million, depending upon the pipeline scenario implemented. Excavation, off-site disposal, and capping (subsurface) would range from $31 million to $36 million, depending upon the pipeline scenario implemented. Excavation, on-site containment cell, and in-situ stabilization/solidification (subsurface) would range from $15 million to $20 million, depending upon the pipeline scenario implemented. The alternative that involves in-situ stabilization/solidification of both surface and subsurface soils ranges from $13 million to $19 million, depending upon the pipeline scenario implemented. The next lowest cost alternative is excavation, on-site containment cell, and capping (subsurface), which ranges from $6 million to $9 million, depending upon the pipeline scenario implemented. The least costly soil alternative involves capping the surface soil and subsurface soil and ranges between $1.5 million to $4.3 million, depending upon the pipeline scenario implemented.

State/Support Agency Acceptance

The State has expressed support for the selected remedy on August 18, 2021.

Community Acceptance

During the public comment period, the community had a few comments of how the selected remedy would affect people who might go on the Site. However, the community did not express any disagreement with or desire not to implement the selected remedy.

17.1 – Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable. 40 CFR §300.430(a)(l)(iii)(A). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

The principal threat wastes for the Site consist of AST sludge, UST contents, and OWS contents. These are considered "principal threat wastes" because they are source material. The principal threat wastes were addressed by removal actions in the Spring of 2019, which eliminated the potential toxicity and mobility of the principal threat wastes by removing and disposing the wastes offsite. In addition, potential exposure to contaminants from the yard surrounding the former EVR-Wood Office has been eliminated by the removal action in the fall of 2018 which also removed and disposed of the contaminated soils offsite.

18.0 SELECTED REMEDY

The Selected Remedy is:

- SED-8 – Fencing, Capping of Pipeline Right-of-Way Only
- SOIL 4-1 – Capping (surface and subsurface soils) and Capping of Pipeline Right-of-Way
- Common Elements

This remedy is protective of human health and the environment, would prevent exposure above health based levels to commercial workers, construction workers, and adolescent recreational users, reduce ecological receptor exposure to contaminants, minimize the amount of habitat that would be destroyed, is fairly easily implementable, is cost effective, will prevent further degradation of the

shallow aquifer, and is expected to allow the property to be used for the reasonably anticipated future industrial/commercial or recreational land use.

The principal threat wastes at the Site have been addressed by the removal actions and subsequent treatment. This remedy, while not utilizing additional treatment of contaminants, does address the residual contamination by engineering controls to reduce the exposure to the hazardous materials. The principal factor in not using treatment alternatives for the residual contamination is the treatment alternatives would result in the destruction of a significant amount of habitat. The Site is undeveloped, and the loss of habitat through treatment alternatives would significantly impact the local ecosystem. This selected remedy does utilize engineering controls to decrease the mobility of the contamination from environmental forces with capping of the contaminants.

The areas addressed by the selected remedy are depicted in Figure 17.

Key components of the Selected Remedy include the following:

- Contaminated swamp soil will be capped along the gas pipeline right-of-way where contaminant concentrations are highest.
- Strikes a balance between reducing exposure to swamp soil contamination and the destruction of the swamp habitat.
- Contaminated soils in the non-wetland areas will be capped, thus capping both surface and subsurface soils.
- For both swamp area and non-wetland capped areas, a high-visibility geotextile fabric will be installed directly on the contaminated soils underneath the cap to alert anyone that may excavate in these areas in the future.
- Loss of wetland habitat will be offset with the purchase of credits from a permitted wetlands mitigation bank since new wetlands cannot be constructed on the Site without the loss of existing habitat.
- Fencing will be constructed near the eastern and southern boundaries of the soil/sediment remediation areas, where Highway 97 and an unnamed road provide relatively unobstructed access to the areas. Warning signs will be installed at regular spaced intervals along the fence to inform potential trespassers of the risks present at the Site.
- ICs (e.g., conveyance notices or zoning ordinances) will be implemented to limit future land use at the Site to recreational use or commercial and industrial use, as appropriate. Development of an operational plan for the pipeline right-of-way with the pipeline company to address contingencies, such as digging in the impacted area.
- Structures and debris from the former wood-treating and refinery operations will be removed to ensure there are no residual sources of contaminants.
- The additional amount of cap material on the pipeline right-of-way will provide additional protection to the pipeline.
- Continuation of groundwater monitoring at the Site to gather information to determine if further action is needed concerning groundwater, as well as to verify the remedial action is functioning as intended and not allowing releases to groundwater.

The total present worth cost for the selected remedy is $6.54 million ($3.3 million Alternative SED-8 + $1.64 million Alternative SOIL 4-1 + $1.6 million Common Elements).

Expected Outcomes of the Selected Remedy

• Available Uses of Land - Because hazardous substances, pollutants, or contaminants will remain on-site above levels that allow for unlimited use and unrestricted exposure, ICs and Five-Year Reviews will be required to aid in the management of the wastes left on-site. The expected outcome of the Selected Remedy will be compatible with the future anticipated commercial/industrial or recreational land use.

• Available Uses of Groundwater – Implementation of the Selected Remedy will decrease any potential sources of contamination to groundwater at the Site. While groundwater is not likely to pose health concerns, groundwater monitoring will be performed to determine if further action is needed concerning groundwater, as well as to verify the Selected Remedy is functioning as intended and not allowing releases of contamination to the groundwater.

• Final Cleanup Levels – Table 4 provides the cleanup levels for soils and sediments to address unacceptable human health risks. Table 5 provides the cleanup levels for soils to address unacceptable ecological risks. These cleanup levels address risk for Current/Future Recreators, Future Commercial/Industrial Workers, and Future Construction Workers. The cleanup levels for soils are for a commercial/industrial and recreational scenarios and achieve a 1.0 X 10^{-5} cancer risk level: the probability of 1 individual in 100,000 developing cancer due to exposure to the individual contaminant. The cancer risk of 10^{-5} is the midpoint of the EPA acceptable excess cancer risk range of 10^{-4} to 10^{-6}. Factors that were considered in selecting the 10^{-5} levels, as opposed to the 10^{-6} point of departure levels [see 40 CFR Section 300.430 (e)(2)(i)(A)(2)], were exposure potential and technical limitations to remediation. An additional approximate 15 acres would be subject to clearing and grubbing to meet the 10^{-6} levels which would impact the ecological diversity at the Site since a majority of these additional acres are heavily wooded/vegetated. In addition, the 10^{-5} levels are consistent with Section 2.14 the Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program (RECAP) (LDEQ, 2003).

• Anticipated Environmental and Ecological Impacts – The Selected Remedy will decrease the potential for wildlife to uptake contaminants, which will improve the ecosystem at the Site. The Selected Remedy will minimize the amount of wetlands destruction and thus, preserve the established habitat and ecosystem at the Site.

• Operation and Maintenance – After remedy construction completion, the State of Louisiana would assume operation and maintenance activities, which would involve cap inspection and maintenance, fence inspection and maintenance, and groundwater monitoring.

19.0 STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP § 300.430(f)(5)(ii), EPA must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

19.1 Protection of Human Health and the Environment

Capping the contaminated surface soils and subsurface soils will provide protection of human health and the environment and will reduce the cancer and noncancer potential risk levels to within acceptable risk levels. There are no short-term threats associated with the media-specific selected remedy that cannot be controlled. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

19.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and the NCP § 300.430(f)(l)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA § 121(d)(4). The selected soil remedial alternative will meet their respective ARARs from Federal and State laws as detailed in Table 8. The selected sediment alternative will meet the Floodplain Management and Protection of Wetlands standards in 44 CFR § 9 and the Section 404 program for discharges of dredged or fill material (described in 40 CFR § 230 - § 232). The selected remedial alternatives also will meet substantive requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAPS) relevant to particulate matter and air pollutants. The worker safety provisions at 29 CFR 1910 will be observed during implementation of the selected remedy.

19.3 Cost-Effectiveness

The Selected Remedy is cost-effective, because the remedy's costs are proportional to its overall effectiveness (see 40 CFR § 300.430(f)(l)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all Federal and any more stringent State ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing four of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; short-term effectiveness; and implementability). The relationship of the overall effectiveness of the Selected Remedy was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

Although capping is less effective in the long term, as compared to other alternatives, it ensures long term effectiveness and regulatory compliance. Compared with the other alternatives, the selected remedy for soil and sediment will best minimize the destruction of wetlands and ecosystem habitat, which comprise almost all of the Site.

The estimated present worth cost of the Selected Remedy is the lowest, as compared to the other alternatives that were considered in the RI/FS, and it achieves the RAOs in the least amount of time versus the other alternatives.

Table 6 and Table 7 presents the costs of each sediment and soil alternative, respectively.

19.4 Utilization of Permanent Solutions to the Maximum Extent Practicable

The selected remedy caps the contaminated soil/sediments, which eliminates the potential exposure pathway and reduces mobility of the contaminants. This remedy can be easily implemented in a short period of time and is also cost effective.

The selected remedy incorporates the previous removal actions, which permanently eliminate the principal threat wastes at the Site by removing and disposing of the wastes offsite.

19.5 Preference for Treatment as a Principal Element

The selected remedy includes treatment as a principal element to address principal threat wastes. The previous removal actions of 2018 and 2019 eliminated the principal threat wastes at the Site by removing and disposing of the wastes offsite.

19.6 Five-Year Review Requirements

Section 121(c) of CERCLA and the NCP § 300.430(f)(5)(iii)(C) provide the statutory and legal bases for conducting five-year reviews. Because this remedy will result in hazardous substances remaining on-site in the soils/sediments above levels that allow for unlimited use and unrestricted exposure, statutory reviews will be conducted every five years to ensure that the remedy is, or will continue to be, protective of human health and the environment

20.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The EVR-Wood Proposed Plan was released for public comment on May 24, 2021. The Proposed Plan identified SED-8 – Fencing, Capping of Pipeline Right-of-Way Only, SOIL 4-1 – Capping (surface and subsurface soils) and Capping of Pipeline Right-of-Way, and the Common Elements as the preferred alternatives for remediation of the contamination of the soil/sediments at the Site. The EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as identified in the Proposed Plan, were necessary or appropriate.

PART 3: RESPONSIVENESS SUMMARY

21.0 RESPONSIVENESS SUMMARY

21.1 – State Role

The Louisiana Department of Environmental Quality (LDEQ), on behalf of the State of Louisiana, reviewed the various remedial alternatives described in the Proposed Plan. The LDEQ has also been actively involved during the Revised RI/FS process to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The State of Louisiana, through the LDEQ, stated its support for the selected remedy on August 18, 2021.

21.2 - Stake Holder Comments and Agency Responses

The Responsiveness Summary provides information about the views of the public and the support agency regarding the remedial alternatives, as well as general concerns about the Site submitted during the public comment period. The concerns of the community should be considered when selecting a remedial alternative. Community acceptance, one of the nine evaluation criteria for Superfund remedial alternatives, considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance. Since the EVR-Wood Site was listed on the NPL in September 2012, Site information has been communicated to and exchanged with the area residents and community leaders.

The Proposed Plan of Action for this Site was issued on May 24, 2021. Copies of the Administrative Record file were made available for public review at the public library in Jennings, Louisiana, the LDEQ office in Baton Rouge, Louisiana, the EPA office in Dallas, Texas, and on the Site's web page. In addition, copies of the Proposed Plan fact sheet were sent to all recipients on the Site mailing list.

The public comment period for the Proposed Plan was held from May 24, 2021 to June 23, 2021. A virtual public meeting was held on May 27, 2021, due to the COVID-19 pandemic restrictions, to present the preferred alternative in the Proposed Plan and take comments from the public. A transcript of the comments received during the public meeting can be found in the Administrative Record. LDEQ and EPA reviewed the written and verbal comments submitted during the public comment period and determined that no significant changes to the remedy as originally identified in the Proposed Plan are necessary or appropriate. The Responsiveness Summary summarizes comments received during the public comment period and presents LDEQ's and EPA's responses.

Comment 1:
How is the remedy going to affect the camp/residence that is on Highway 97 on the Site?

LDEQ and EPA Response 1:
The former EVR-Wood office is now being used as a residence by the landowner. A removal action has been completed to address the yard around the residence by removing and disposing the contaminated soil offsite. Therefore, potential exposure to contamination in the yard around the residence has appropriately addressed.

Comment 2:
How will the remedy affect the local hunters that use the pipeline right-of-way to access hunting areas along the bayou area?

LDEQ and EPA Response 2:
The remedy will make sure the contamination areas in the western side of the Site is not available for exposure by hunters that might use that portion of the Site. Therefore, after completion of the remedy, there will be no potential unacceptable risks for any recreational users and will be accessible for hunters.

Comment 3:
For residents that have long term concerns, is this the only chance for them to comment regarding the proposed cleanup options?

LDEQ and EPA Response 3:
The public comment period for the proposed cleanup options ran from May 24, 2021, to June 23, 2021. The opportunity to comment on the cleanup options closed on June 23, 2021. After the selected remedy has been implemented, the community surrounding the Site will have the opportunity to comment on the effectiveness of the implemented remedy during the Five-Year Review process.

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FIGURES

RECORD OF DECISION

EVR-Wood Treating/Evangeline Refining Company Superfund Site

Acadia Parish, Louisiana

Figure 1 – Site Location

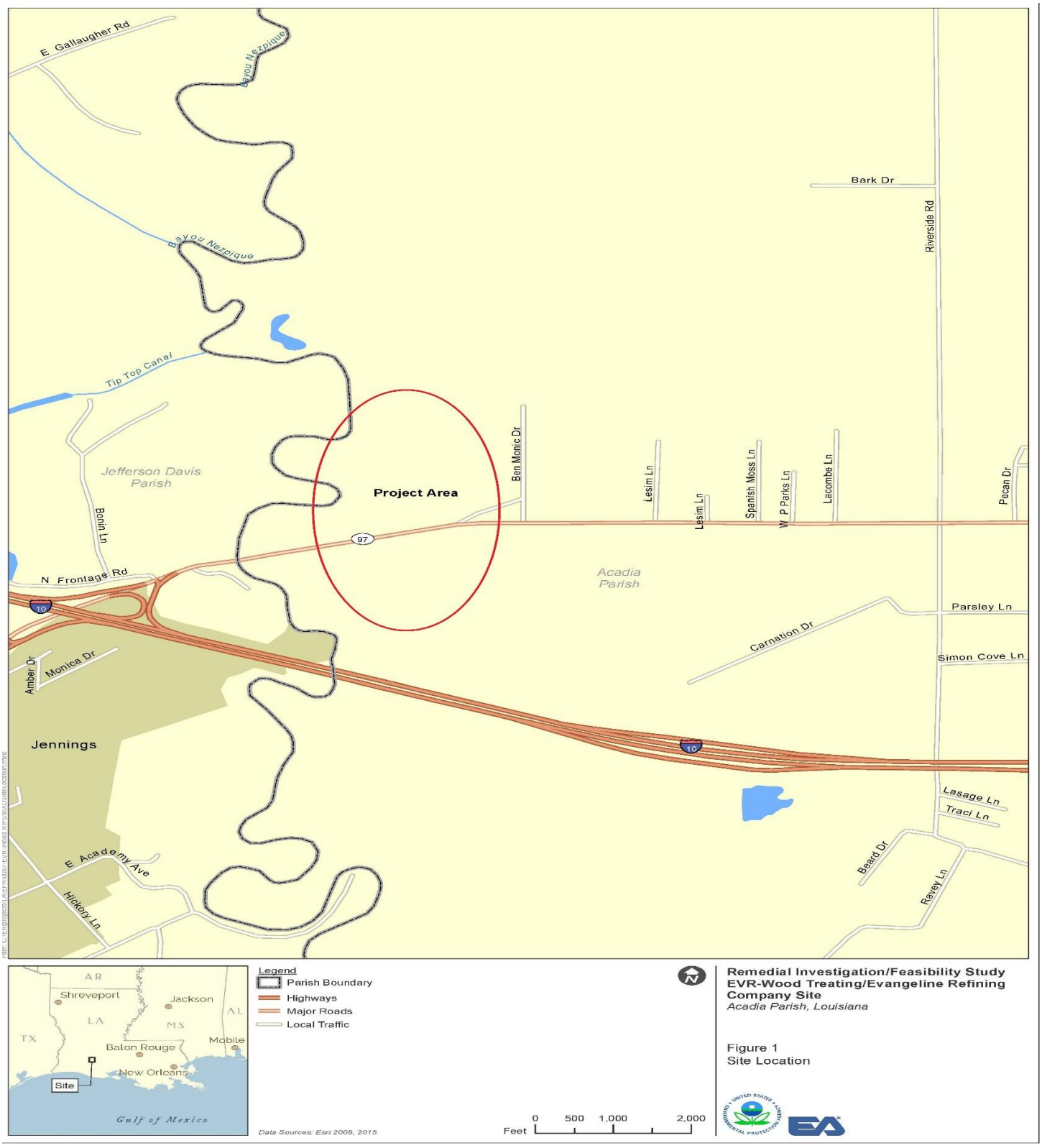

Figure 2 – Site Layout

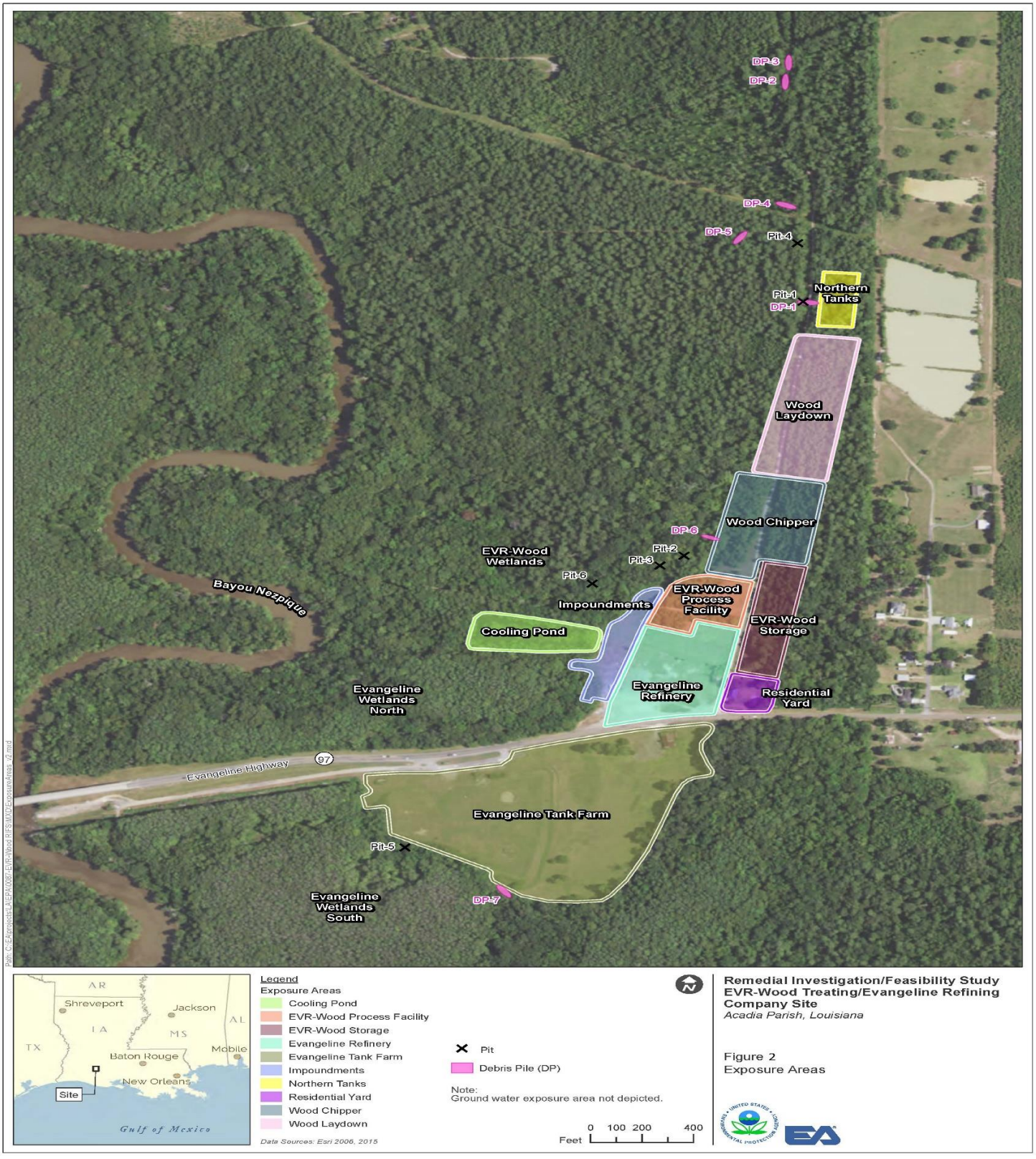

Figure 3 – 100-year Floodplain Area

Figure 4 – Human Health Conceptual Site Model

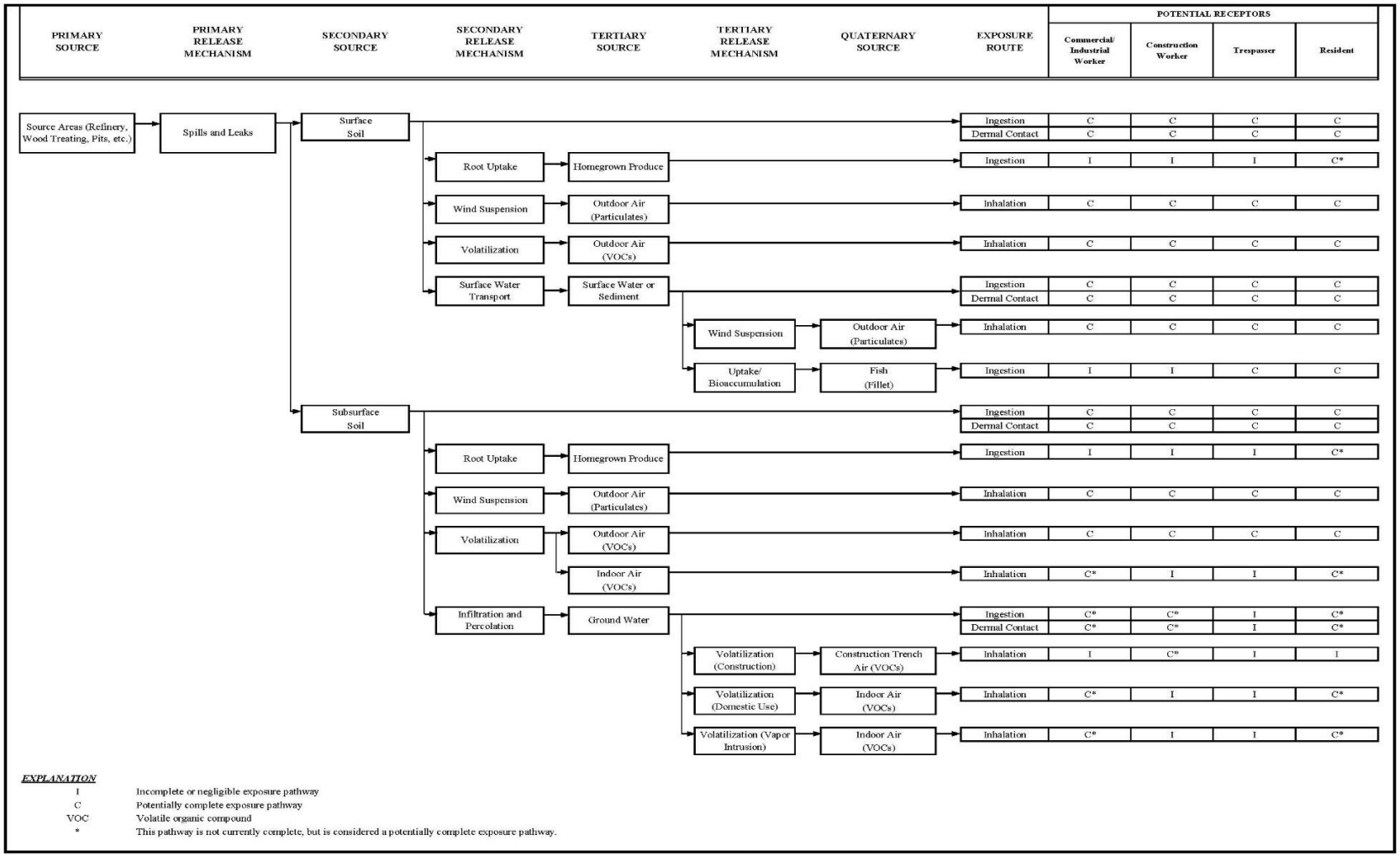

Figure 4 Preliminary Human Health Conceptual Site Model

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069707

Figure 5 - Ecological Conceptual Site Model

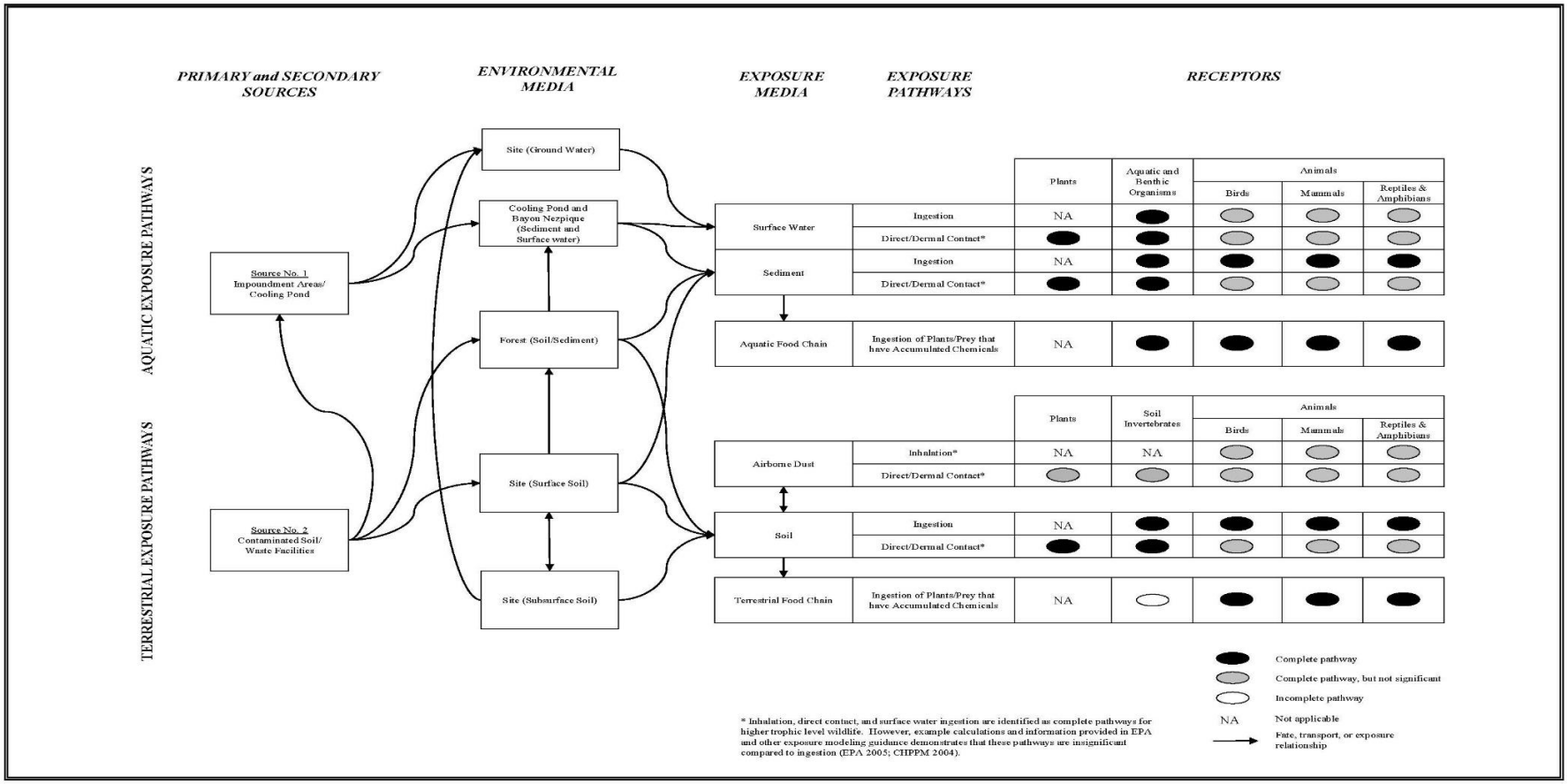

Figure 5 Preliminary Ecological Conceptual Site Model

001304

069708

Figure 6 – Graphical Human Health Conceptual Site Model

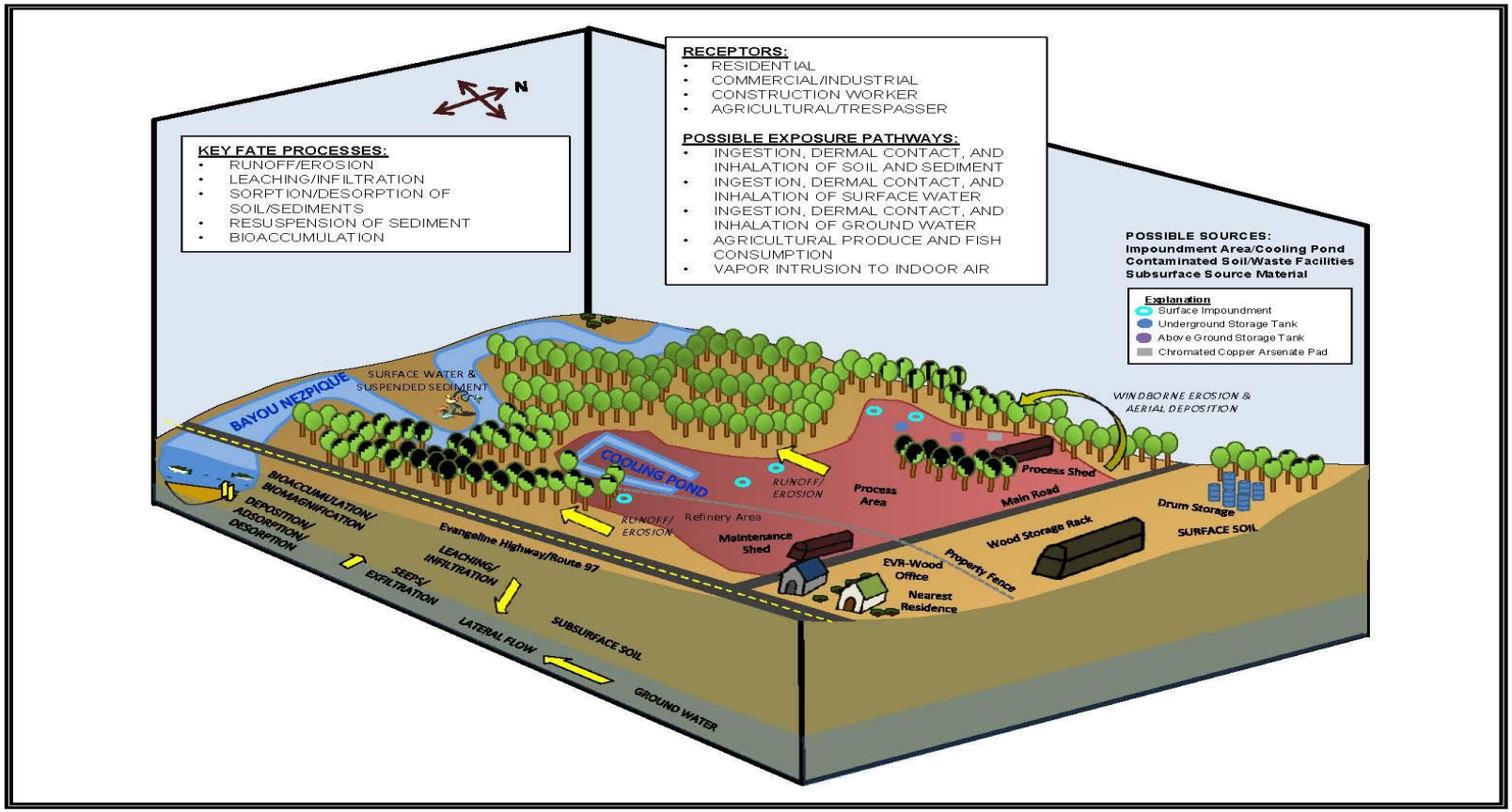

Figure 6 Graphical Presentation of the Preliminary Human Health Conceptual Site Model

001301

069709

Figure 7 – Graphical Ecological Conceptual Site Model

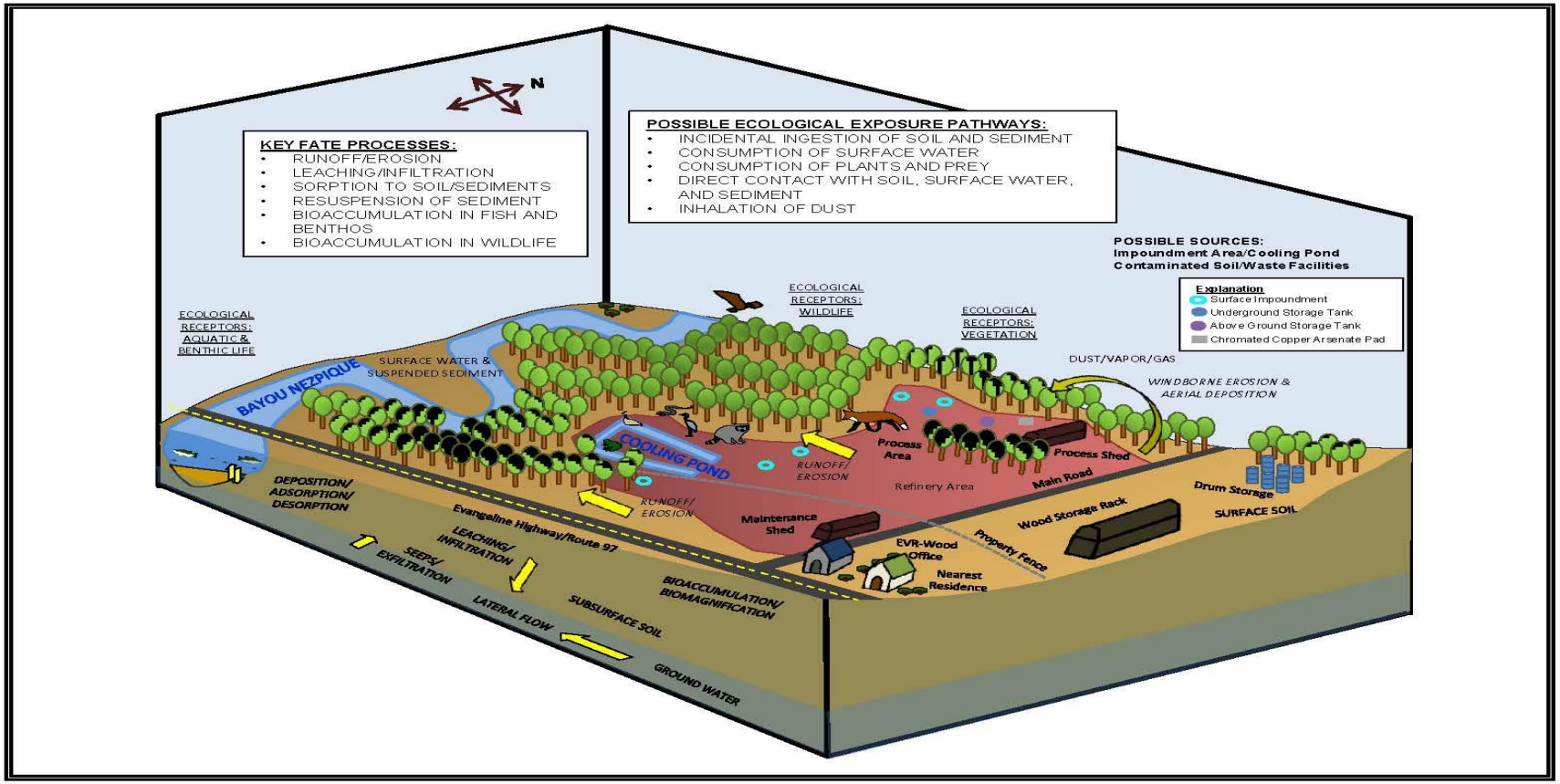

Figure 7 Graphical Presentation of the Preliminary Ecological Conceptual Site Model

001303

069710

Figure 8 – Surface Water Sample Locations

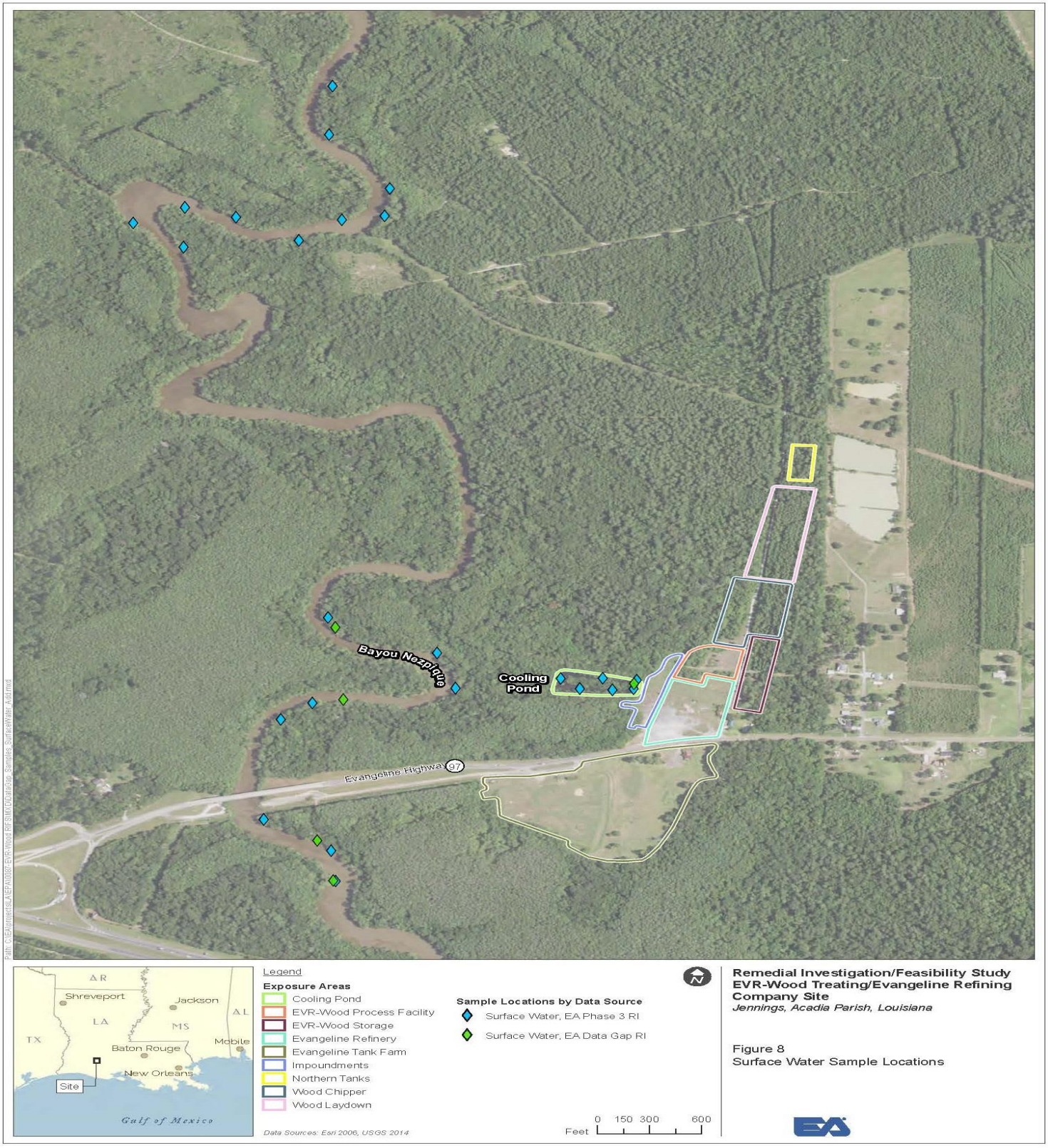

Figure 9 – Sediment Sample Locations

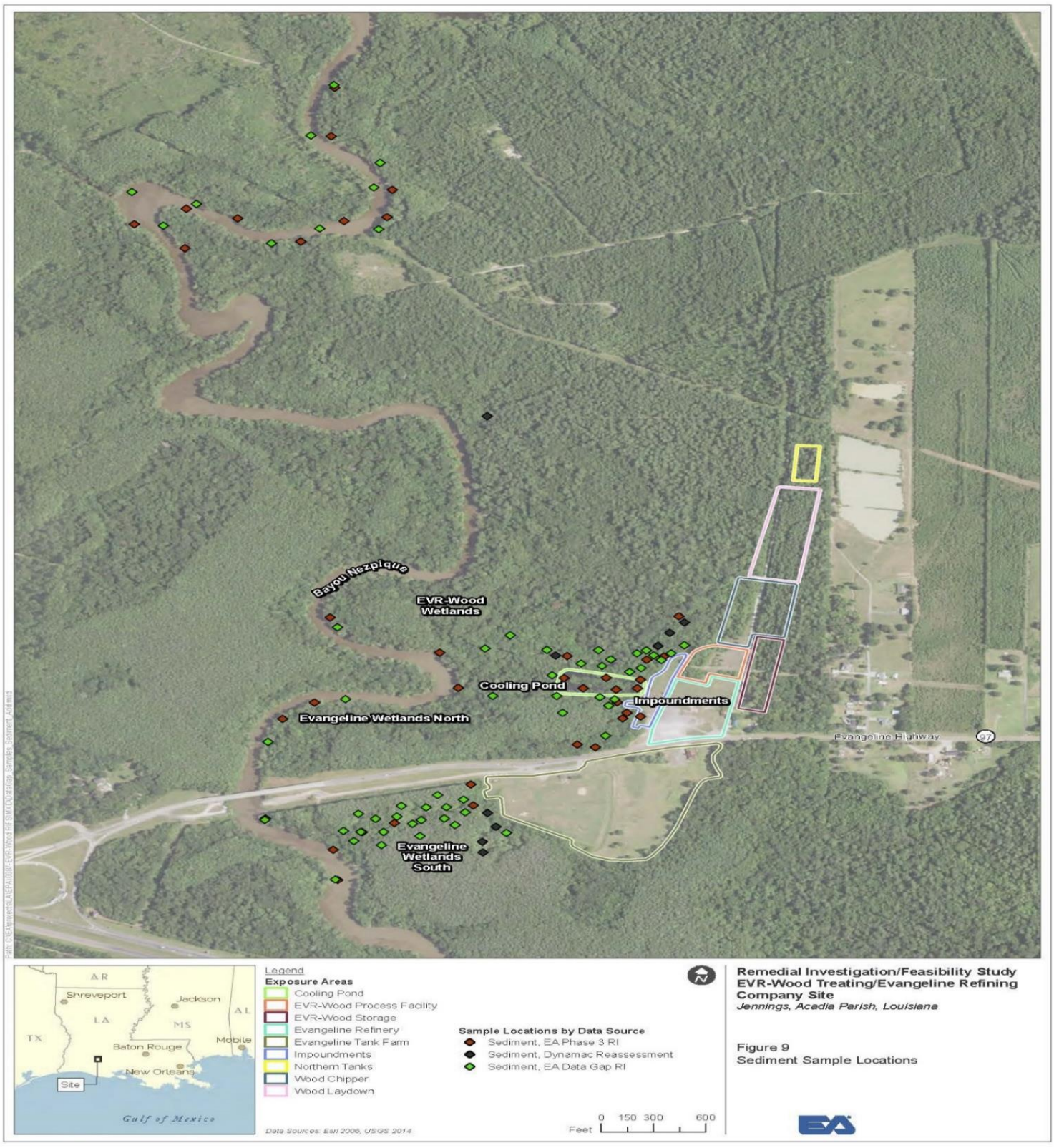

Figure 10 – Surface Soil Sample Locations

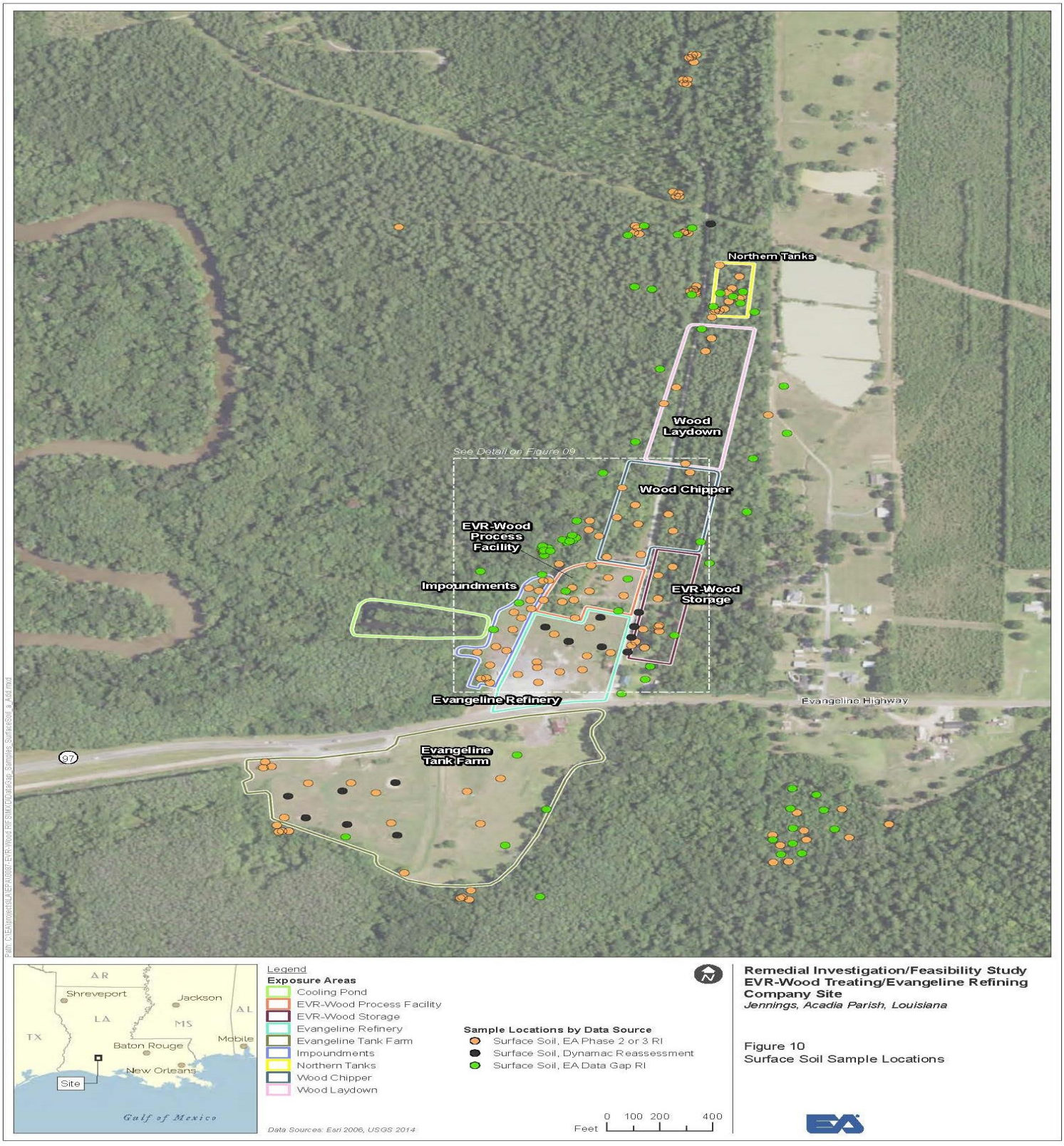

Figure 11 – Subsurface Soil Sample Locations

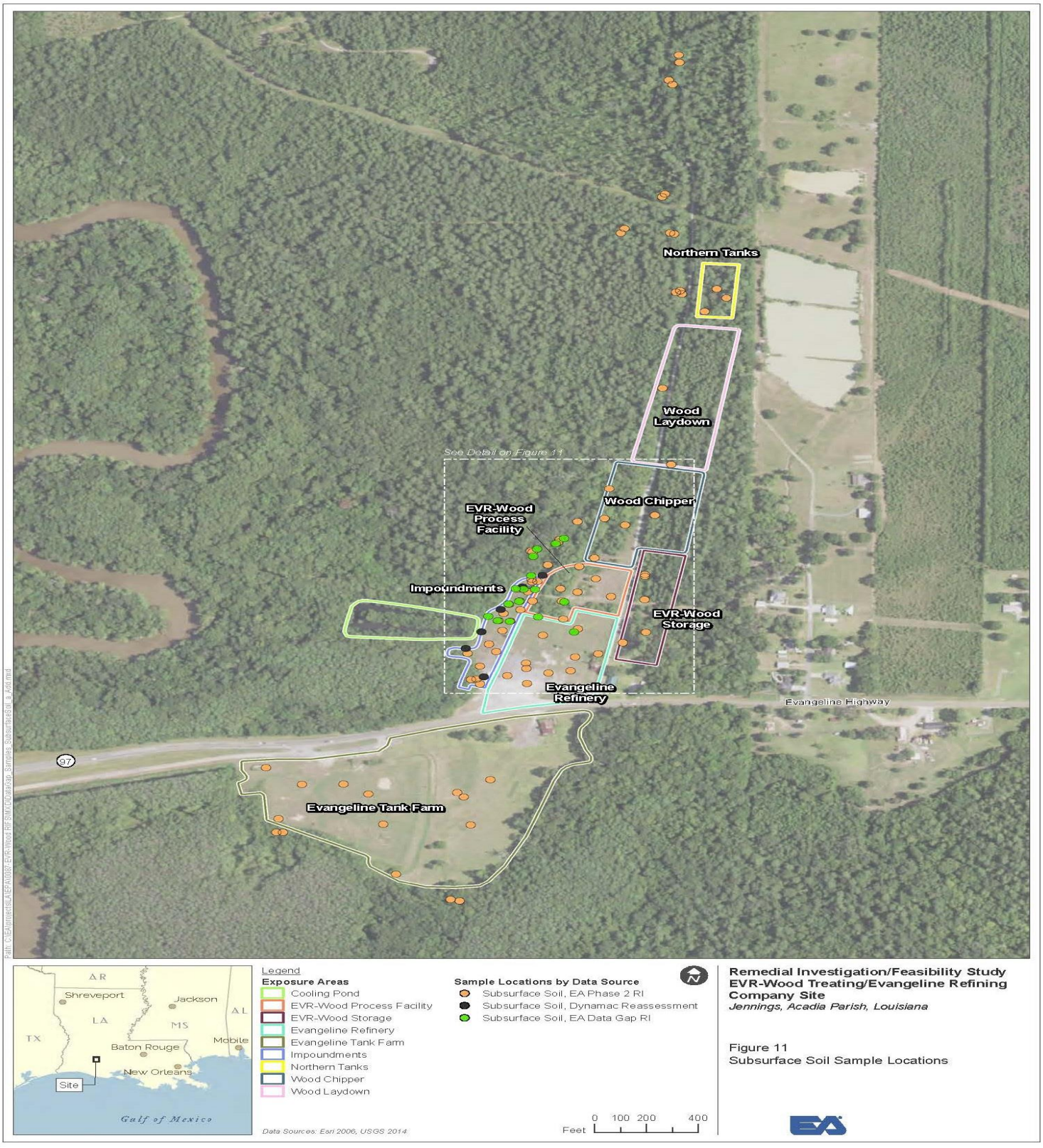

Figure 12 – Fish Sample Locations

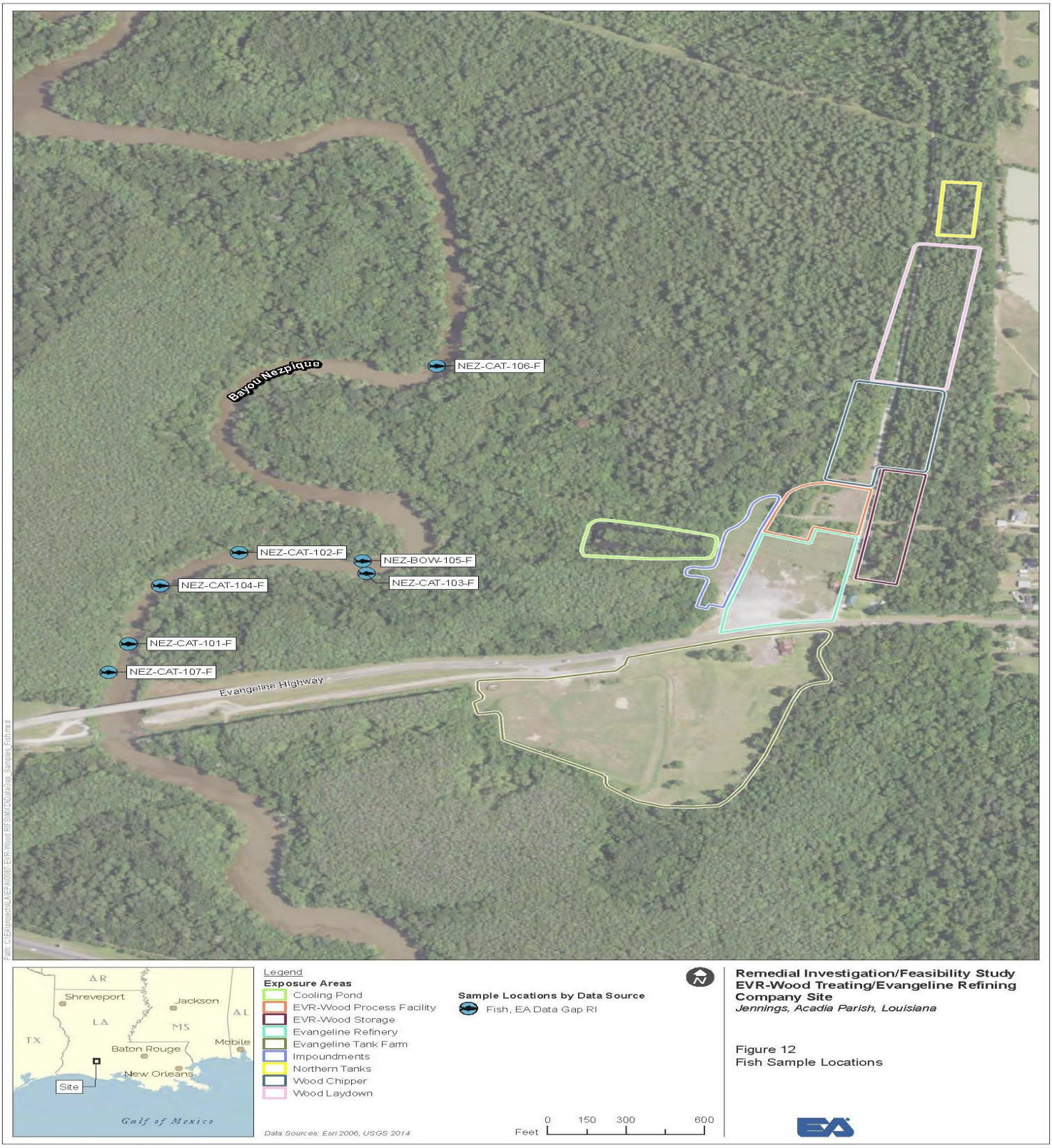

Figure 13 – Crayfish Sample Locations

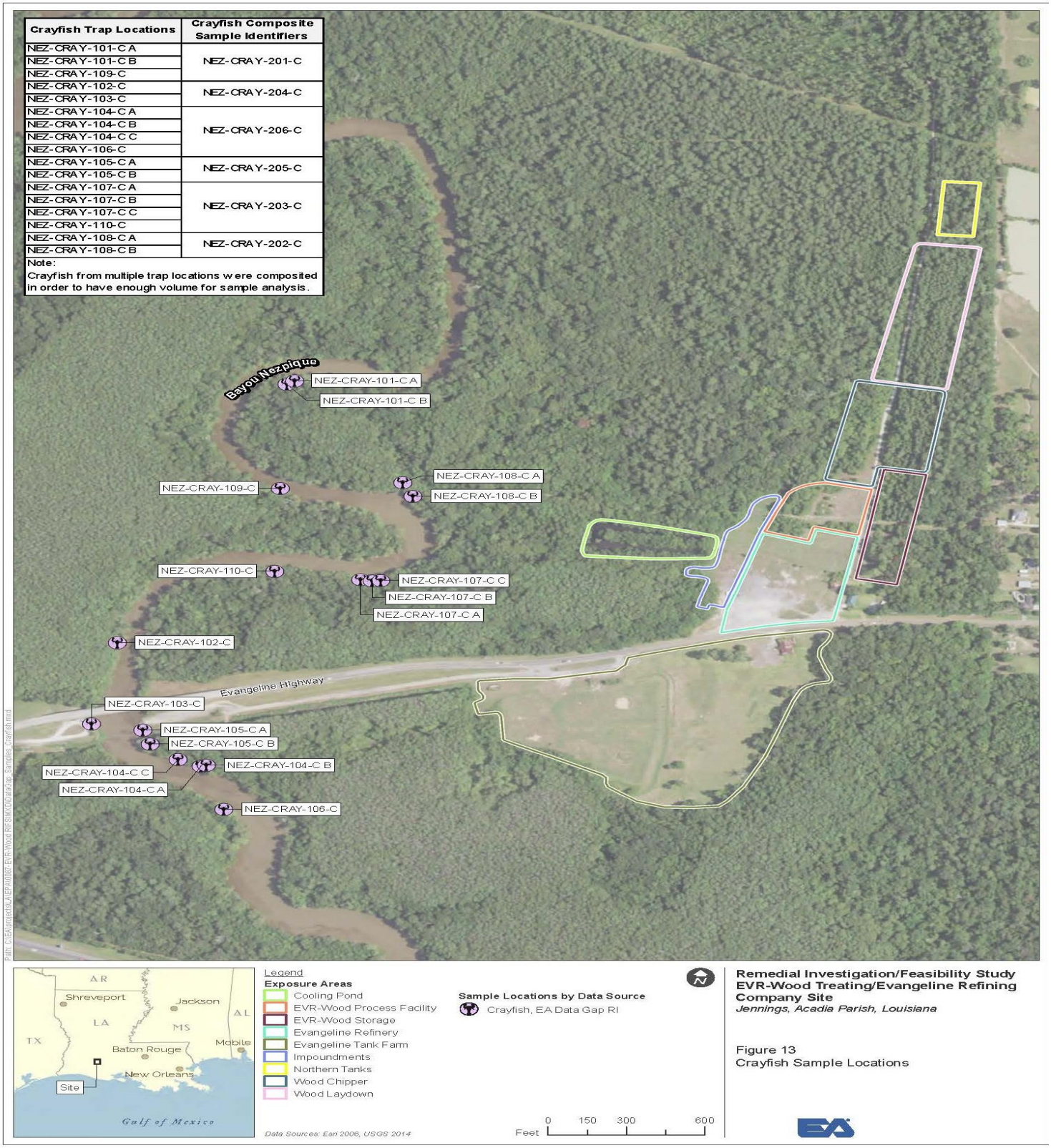

Figure 14 – Groundwater Sample Locations

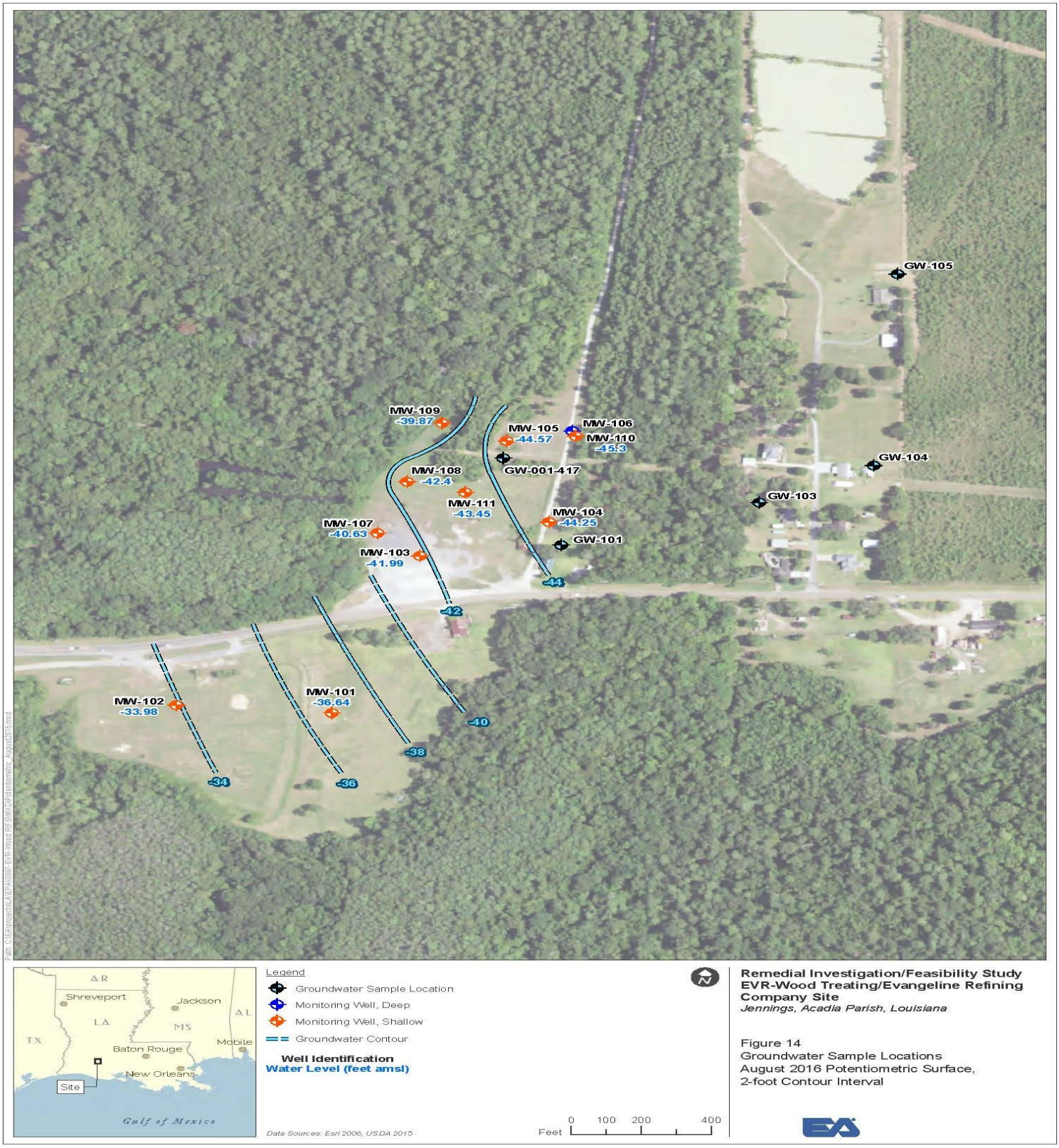

Figure 15 – Human Health Exposure Areas

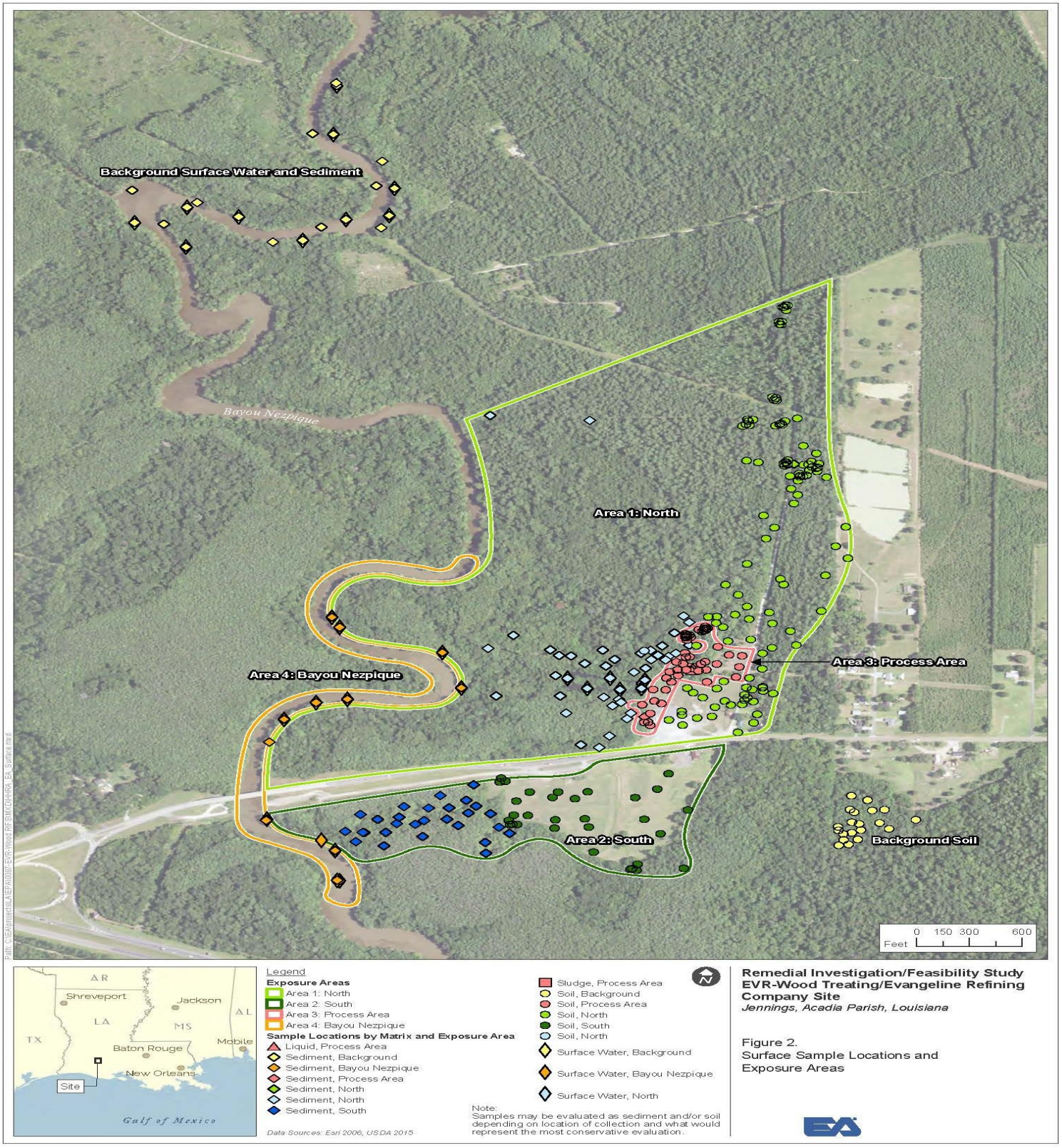

Figure 16 – Ecological Exposure Areas

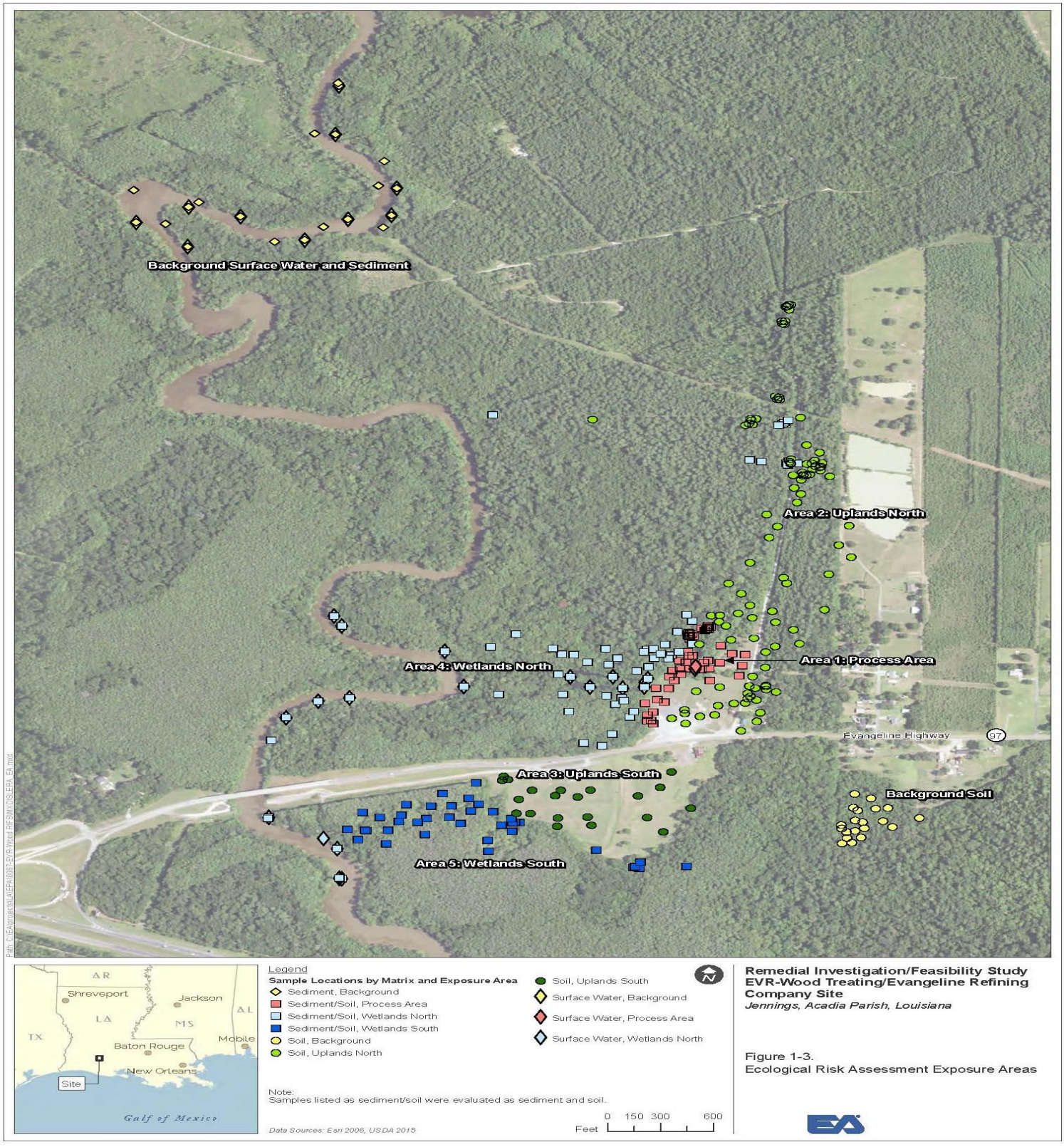

Figure 17 – Selected Remedy

TABLES

RECORD OF DECISION

EVR-Wood Treating/Evangeline Refining Company Superfund Site

Acadia Parish, Louisiana

Table 1 – Remedial Investigation Sample Summary

TABLE 1 - REMEDIAL INVESTIGATION SAMPLE SUMMARY

Matrix	Depth Range	Semivolatile Organic Compounds	Metals	Dioxins	Total Organic Carbon	pH	AVS/ SEM	Particle Size	Synthetic Precipitation Leaching Procedure	Geotechnical	Alkalinity	Hardness	Total Suspended Solids	Volatile Organic Compounds	EPH/ VPH	PCBs as Aroclors	Pesticides	Hexavalent Chromium	Organic Lead	Tetraethyl Lead	Total Petroleum Hydrocarbons	Total Dissolved Solids	Monitored Natural Attenuation Parameters	Asbestos
Ground Water	NA	14	18	0	11	0	0	0	0	0	0	0	0	18	5	16	16	17	5	11	12	12	11	0
Liquid	NA	4	4	0	0	3	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0
Sediment	0 to 6 in	70	52	43	55	10	48	10	0	0	0	0	0	2	10	0	0	18	21	0	0	0	0	0
Sediment	6 to 12 in	17	7	10	15	2	0	0	0	0	0	0	0	0	2	0	0	6	6	0	0	0	0	0
Sludge	NA	3	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Soil	0 to 2 ft	154	191	45	52	3	0	3	0	0	0	0	0	74	3	19	19	8	14	0	20	0	0	6
Soil	2 to 15 ft	109	99	37	0	0	0	2	2	2	0	0	0	74	0	5	5	1	14	0	18	0	0	0
Soil	> 15 ft	109	74	14	0	0	0	12	7	7	0	0	0	21	0	3	3	0	4	0	2	0	0	0
Surface Water	NA	24	25	0	4	0	0	0	0	0	2	2	4	14	5	0	0	0	0	0	0	0	0	0
Tissue-Crayfish	NA	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tissue-Fish	NA	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note:

This summary table does not include field duplicate samples.

AVS/SEM - Acid volatile sulfide/Simultaneously extracted metals

Dioxins - Polychlorinated dibenzodioxins and polychlorinated dibenzofurans

EPH - Extractable petroleum hydrocarbons

NA - Not applicable

PCBs - Polychlorinated biphenyls

VPH - Volatile petroleum hydrocarbons

Table 2 – Human Health Chemicals of Concern

TABLE 2
HUMAN HEALTH RISK ASSESSMENT SUMMARY OF CONCLUSIONS

Receptor	HHRA Results			Chemical of Concern[2]
	Media	Carcinogenic Risks[1]	Non-Carcinogenic Hazards[1]	
Area 1 – North of Highway 97				
Child Resident[3]	Surface Soil[4]	6×10^{-4}	26	**Cancer Risks**: Dioxin TEQ, arsenic, benzo(a)pyrene, PCP **Non-Cancer Hazards**: Dioxin TEQ, arsenic, lead[5]
	Sediment	3×10^{-4}	25	**Cancer Risks**: Dioxin TEQ, arsenic **Non-Cancer Hazards**: Dioxin TEQ
Adult Resident[3]	Surface Soil[4]	6×10^{-4}	3	**Cancer Risks**: Dioxin TEQ, arsenic, benzo(a)pyrene, PCP **Non-Cancer Hazards**: NA
	Sediment	3×10^{-4}	5	**Cancer Risks**: Dioxin TEQ, arsenic **Non-Cancer Hazards**: Dioxin TEQ
Construction Worker	Surface Soil	2×10^{-5}	6	**Cancer Risks**: Dioxin TEQ, arsenic **Non-Cancer Hazards**: Dioxin TEQ, arsenic
Commercial Worker	Surface Soil	1×10^{-4}	2	**Cancer Risks:** Dioxin TEQ, arsenic **Non-Cancer Hazards**: NA
Adolescent Recreational User	Surface Soil	2×10^{-5}	0.8	**Cancer Risks**: Dioxin TEQ, arsenic **Non-Cancer Hazards**: NA
	Sediment	1×10^{-4}	10	**Cancer Risks**: Dioxin TEQ **Non-Cancer Hazards**: Dioxin TEQ

Table 2 - Human Health Chemicals of Concern (Continued)

TABLE 2
HUMAN HEALTH RISK ASSESSMENT SUMMARY OF CONCLUSIONS

Receptor	HHRA Results			Chemical of Concern[2]
	Media	Carcinogenic Risks[1]	Non-Carcinogenic Hazards[1]	
Area 3 – Process Area				
Child Resident[3]	Surface Soil[4]	2×10^{-2}	1382	**Cancer Risks**: Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, 2,6-dinitrotoluene, 1,1'-biphenyl, benzene, ethylbenzene, PCP **Non-Cancer Hazards**: Dioxin TEQ, arsenic, benzo(a)pyrene, dibenzofuran, fluoranthene, 2-methylnaphthalene, naphthalene, pyrene, 1,1'-biphenyl, PCP
	Subsurface Soil	8×10^{-3}	430	**Cancer Risks**: Dioxin TEQ, arsenic, hexavalent chromium (+6), benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, 1,1'-biphenyl, PCP **Non-Cancer Hazards**: Dioxin TEQ, arsenic, benzo(a)pyrene, dibenzofuran, 2-methylnaphthalene, naphthalene, 1,1'-biphenyl, PCP
	Sediment	2×10^{-4}	2	**Cancer Risks**: Arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, PCP **Non-Cancer Hazards**: NA
Area 3 – Process Area				
Adult Resident[3]	Surface Soil[4]	2×10^{-2}	160	**Cancer Risks**: Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, 2,6-dinitrotoluene, 1,1'-biphenyl, benzene, ethylbenzene, PCP **Non-Cancer Hazards**: Dioxin TEQ, dibenzofuran, naphthalene, 1,1'-biphenyl, PCP
	Subsurface Soil	8×10^{-3}	58	**Cancer Risks**: Dioxin TEQ, arsenic, hexavalent chromium (+6), benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, 1,1'-biphenyl, PCP **Non-Cancer Hazards**: Dioxin TEQ, dibenzofuran, naphthalene, 1,1'-biphenyl
	Sediment	2×10^{-4}	0.4	**Cancer Risks**: Arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, PCP **Non-Cancer Hazards**: NA

Table 2 - Human Health Chemicals of Concern (Continued)

TABLE 2
HUMAN HEALTH RISK ASSESSMENT SUMMARY OF CONCLUSIONS

Receptor	HHRA Results			Chemical of Concern[2]
	Media	Carcinogenic Risks[1]	Non-Carcinogenic Hazards[1]	
Construction Worker	Surface Soil	6×10^{-4}	324	**Cancer Risks**: Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, naphthalene, PCP **Non-Cancer Hazards**: Dioxin TEQ, arsenic, benzo(a)pyrene, dibenzofuran, 2-methylnaphthalene, naphthalene, 1,1'-biphenyl, PCP
	Subsurface Soil	2×10^{-4}	108	**Cancer Risks**: Dioxin TEQ, arsenic, benzo(a)pyrene, naphthalene, PCP **Non-Cancer Hazards**: Dioxin TEQ, dibenzofuran, naphthalene, 1,1'-biphenyl, PCP

Table 2 - Human Health Chemicals of Concern (Continued)

TABLE 2
HUMAN HEALTH RISK ASSESSMENT SUMMARY OF CONCLUSIONS

Receptor	HHRA Results			Chemical of Concern[2]
	Media	Carcinogenic Risks[1]	Non-Carcinogenic Hazards[1]	
Area 3 – Process Area				
Commercial Worker	Surface Soil	4×10^{-3}	91	**Cancer Risks**: Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, naphthalene, 2,6-dinitrotoluene, benzene, PCP **Non-Cancer Hazards**: Dioxin TEQ, naphthalene, 1,1'-biphenyl
Adolescent Recreational User	Surface Soil	9×10^{-4}	40	**Cancer Risks**: Dioxin TEQ, arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, naphthalene, PCP **Non-Cancer Hazards**: Dioxin TEQ
	Sediment	8×10^{-5}	1	**Cancer Risks**: Arsenic, benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, PCP **Non-Cancer Hazards**: NA

Note:

[1] Total risks and hazards presented for each Area do not equal the sum of individual environmental media due to rounding.

[2] A chemical of concern is defined as a chemical that contributes greater than 10^{-6} carcinogenic risk or non-carcinogenic hazard greater than 1.

[3] Carcinogenic risks for the resident adult and child are combined and presented as a total lifetime cumulative carcinogenic risk.

[4] Surface soil risks include ingestion of homegrown produce.

[5] Although average soil-lead concentrations did not exceed risk-based criteria, localized concentrations in excess of 1,000 milligrams per kilogram (mg/kg) should be addressed to minimize potential exposure risks.

Dioxin TEQ - polychlorinated dibenzodioxin and polychlorinated dibenzofuran toxicity equivalence
HHRA - Human Health Risk Assessment
NA - not applicable
PCP - pentachlorophenol

Table 3 – Ecological Chemicals of Concern

TABLE 3
SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT SUMMARY OF CONCLUSIONS

Analyte	Process Area	Uplands Area North	Uplands Area South	Wetlands Area North	Wetlands Area South
Arsenic	-plants -soil invertebrates -terrestrial birds -terrestrial mammals -aquatic mammals -benthic invertebrates -reptiles and amphibians	-plants -soil invertebrates -terrestrial birds -terrestrial mammals -reptiles and amphibians	None	None	None
Chromium	-plants -soil invertebrates -terrestrial birds -benthic invertebrates -reptiles and amphibians	-plants -soil invertebrates -terrestrial birds -reptiles and amphibians	None	-plants -soil invertebrates -reptiles and amphibians	None
Copper	-terrestrial birds -aquatic birds -aquatic mammals -reptiles and amphibians	-plants -soil invertebrates -terrestrial birds -terrestrial mammals -reptiles and amphibians	None	None	None
Lead	-terrestrial birds -reptiles and amphibians	-plants -terrestrial birds -terrestrial mammals -reptiles and amphibians	None	-terrestrial birds -reptiles and amphibians	None
Mercury	None	-plants -soil invertebrates -reptiles and amphibians	None	-soil invertebrates -reptiles and amphibians	None
Vanadium	None	-terrestrial birds -reptiles and amphibians	None	None	None
Dioxin Toxicity Equivalence	-terrestrial birds -aquatic birds -terrestrial mammals -aquatic mammals -benthic invertebrates -reptiles and amphibians	None	None	-terrestrial birds -aquatic birds -terrestrial mammals -aquatic mammals -benthic invertebrates -reptiles and amphibians	-aquatic mammals -benthic invertebrates -reptiles and amphibians
Polycyclic Aromatic Hydrocarbons	-plants -soil invertebrates -aquatic birds -terrestrial mammals -aquatic mammals -benthic invertebrates -reptiles and amphibians	None	None	None	None
1,1'-biphenyl	-plants -benthic invertebrates -reptiles and amphibians	None	None	None	None

Table 3 – Ecological Chemicals of Concern (Continued)

TABLE 3
SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT SUMMARY OF CONCLUSIONS

Analyte	Process Area	Uplands Area North	Uplands Area South	Wetlands Area North	Wetlands Area South
2,3,4,6-tetrachlorophenol	-soil invertebrates -benthic invertebrates -reptiles and amphibians	None	None	None	None
Bis(2-ethylhexyl)phthalate	-terrestrial birds -aquatic birds -benthic invertebrates -reptiles and amphibians	None	None	None	None
Dibenzofuran	-benthic invertebrates -reptiles and amphibians	None	None	None	None
Pentachlorophenol	-plants -soil invertebrates -terrestrial birds -aquatic birds -reptiles and amphibians	-plants -soil invertebrates -terrestrial birds -reptiles and amphibians	None	None	None
Total Xylenes	-benthic invertebrates -reptiles and amphibians	None	None	None	None

Table 4 – Human Health Cleanup Levels

Table 4 - Human Health Cleanup Levels

Chemical of Concern	Cleanup Level (mg/kg)
Area One Soil	
Dioxin TEQ	7.2×10^{-4}
Arsenic	35
Area One Sediment (Wetlands)	
Dioxin TEQ	8.3×10^{-3}
Area Three Soil	
Dioxin TEQ	7.2×10^{-4}
Arsenic	35
cPAH TEQ	30
Pentachlorophenol	70

Note:
cPAH – carcinogenic polycyclic aromatic hydrocarbons
dioxin – polychlorinated dibenzodioxin
mg/kg – milligram(s) per kilogram
PRG – preliminary remediation goal
TEQ – toxicity equivalence

Table 5 – Ecological Cleanup Levels

Table 5 - Ecological Cleanup Levels

Chemical of Concern	Cleanup Level (mg/kg)
Arsenic	23.5
Chromium	76.5
Copper	88
Lead	120
Mercury	0.3
Vanadium	42.5
Total PAHs[(a)]	1.6
HMW PAHs[(a)]	18
LMW PAHs[(a)]	29
Dioxin TEQ (mammals)	0.000297
Pentachlorophenol	3

Note:

[(a)] Individual PRGs were developed for HMW PAHs, LMW PAHs, and total PAHs based on specific receptors. However, because the total PAH PRG is lower than both HMW and LMW PAH PRGs individually, only the total PAH PRG is retained.

dioxin – polychlorinated dibenzodioxin
HMW – high molecular weight
LMW – low molecular weight
mg/kg – milligram(s) per kilogram
PAH – polycyclic aromatic hydrocarbon
PRG – preliminary remediation goal
TEQ – toxicity equivalence

Table 6 – Sediment Alternatives – Comparison to National Contingency Plan Remedy Selection Criteria

TABLE 6
COMPARATIVE EVALUATION OF SEDIMENT ALTERNATIVES

Alternatives	Remedy Components			Threshold Criteria		Balancing Criteria [a]								
	Pipeline Approach	Primary Technologies	Disposal	Overall protection of human health and the environment	Compliance with ARARs	Long-term effectiveness and permanence	Reduction in toxicity, mobility, or volume through treatment	Short-term effectiveness	Construction Time (months)	Implementability	**Total Cost [b][c] (present worth) =**	Capital cost +	Lifetime O&M cost + (present value)	Lifetime LTM cost (present value)
SED-1: NFA				No	Yes	★	★	★★★★	NA	★★★★	**$ -**	$ -	$ -	$ -
SED-2	A: Reroute [d]	Mechanical Excavation, and Dewatering	Off-site, RCRA Subtitle C Landfill	Yes	Yes	★★★★	★★★★	★	23	★	**$ 76,600,000**	$ 76,600,000	$ 24,000	$ -
	B: Work Around			Yes	Yes	★★★★	★★★	★	21	★★★	**$ 68,200,000**	$ 68,200,000	$ 24,000	$ -
	C: Cap			Yes	Yes	★★★★	★★★★	★	21	★★★	**$ 68,600,000**	$ 68,500,000	$ 65,100	$ -
SED-3	A: Reroute [d]	Mechanical Excavation, and Dewatering	On-site, Containment Cell	Yes	Yes	★★★	★★★	★★	23	★	**$ 30,700,000**	$ 29,700,000	$ 685,000	$ 336,000
	B: Work Around			Yes	Yes	★★★	★★	★★	21	★★	**$ 26,700,000**	$ 25,700,000	$ 685,000	$ 336,000
	C: Cap			Yes	Yes	★★★	★★★	★★	21	★★	**$ 27,100,000**	$ 26,000,000	$ 727,000	$ 336,000
SED-4	A: Reroute [d]	Monitored Natural Recovery		Yes	Yes	★	★	★★★★	NA	★★	**$ 3,200,000**	$ 2,600,000	$ 24,000	$ 529,000
	B: Work Around			Yes	Yes	★	★	★★★★	NA	★★★★	**$ 600,000**	$ 10,000	$ 24,000	$ 529,000
	C: Cap			Yes	Yes	★	★★	★★★	NA	★★★	**$ 900,000**	$ 300,000	$ 65,000	$ 529,000
SED-5	A: Reroute [d]	Enhanced Monitored Natural Recovery		Yes	Yes	★★	★★	★★★	8	★	**$ 12,800,000**	$ 12,200,000	$ 24,000	$ 529,000
	B: Work Around			Yes	Yes	★★	★	★★★	8	★★★	**$ 9,800,000**	$ 9,200,000	$ 24,000	$ 529,000
	C: Cap			Yes	Yes	★★	★★	★★★	8	★★★	**$ 10,100,000**	$ 9,500,000	$ 65,000	$ 529,000
SED-6	A: Reroute [d]	Capping		Yes	Yes	★★	★★	★★	13	★	**$ 14,100,000**	$ 14,000,000	$ 86,000	$ -
	B: Work Around			Yes	Yes	★★	★	★★	12	★★	**$ 10,700,000**	$ 10,600,000	$ 86,000	$ -
	C: Cap			Yes	Yes	★★	★★	★★	12	★★	**$ 10,900,000**	$ 10,800,000	$ 127,000	$ -
SED-7		Fencing		No	Yes	★	★	★★★★	3	★★★★	**$ 900,000**	$ 800,000	$ 134,000	$ -
SED-8		Fencing, and Capping (Pipeline ROW Only)		Yes	Yes	★	★	★★★	6	★★★	**$ 3,500,000**	$ 3,300,000	$ 175,000	$ -
SED-9		Fencing, and Capping (Pipeline ROW and Hot Spots Only)		Yes	Yes	★★	★	★★★	7	★★★	**$ 6,500,000**	$ 6,300,000	$ 175,000	$ -

Table 6 – Sediment Alternatives – Comparison to National Contingency Plan Remedy Selection Criteria (Continued)

TABLE 6
COMPARATIVE EVALUATION OF SEDIMENT ALTERNATIVES

	Remedy Components			Threshold Criteria		Balancing Criteria [a]								
Alternatives	Pipeline Approach	Primary Technologies	Disposal	Overall protection of human health and the environment	Compliance with ARARs	Long-term effectiveness and permanence	Reduction in toxicity, mobility, or volume through treatment	Short-term effectiveness	Construction Time (months)	Implementability	**Total Cost [b][c] (present worth) =**	Capital cost +	Lifetime O&M cost + (present value)	Lifetime LTM cost (present value)

NOTE:

(a) The alternatives were assigned one of the following ratings for each balancing criteria, except cost:

★★★★ = Excellent performance against the criterion.

★★★ = Good performance against the criterion.

★★ = Fair performance against the criterion.

★ = Poor performance against the criterion.

(b) The expected accuracy of a Feasibility Study cost estimate is -30/+50 percent. Present value costs were calculated using a 7 percent discount rate and a 30 one-year payment periods.

(c) The total costs presented on this table do not include the capital costs to implement the Common Components (approximately $400,000).

(d) On this table, the capital costs and construction time to reroute the gas-pipeline were added to both soil AND sediment alternatives that include Approach A. However, if Approach A is part of the selected remedy, the costs and time should only be counted once for both media to avoid double counting. For reference, the cost and time to reroute the pipeline are approximately $2,000,000 and 2 months.

ARAR - applicable or relevant and appropriate requirement
LTM - long-term monitoring
NFA - no further action
O&M - operations and maintenance
RCRA - Resource Conservation and Recovery Act
TBD - to be determined

Table 7 – Soil Alternatives – Comparison to National Contingency Plan Remedy Selection Criteria

TABLE 7
COMPARATIVE EVALUATION OF SOIL ALTERNATIVES

Alternatives		Remedy Components				Threshold Criteria		Balancing Criteria [a]								
		Pipeline Approach	Primary Technologies (by media type): Surface Soil	Primary Technologies (by media type): Subsurface Soil	Disposal	Overall protection of human health and the environment	Compliance with ARARs	Long-term effectiveness and permanence	Reduction in toxicity, mobility, or volume through treatment	Short-term effectiveness	Construction Time (months)	Implementability	**Total Cost [b][c] (present worth) =**	Capital cost +	Lifetime O&M cost + (present value)	Lifetime LTM cost (present value)
No Action	SOIL-1					No	Yes	★	★	★★★★	NA	★★★★	**$ -**	$ -	$ -	$ -
Excavation Alternatives	SOIL-2-1	A: Reroute [d]	Excavation and backfill with clean soil	Excavation and backfill with clean soil	Off-site, RCRA Subtitle C Landfill	Yes	Yes	★★★★	★★★★	★	11	★	**$ 95,100,000**	$ 95,100,000	$ 24,000	$ -
		B: Work Around				Yes	Yes	★★★	★★★	★★	8	★★★★	**$ 78,600,000**	$ 78,600,000	$ 24,000	$ -
		C: Cap				Yes	Yes	★★★★	★★★★	★★	8	★★★★	**$ 78,800,000**	$ 78,700,000	$ 65,100	$ -
	SOIL-2-2	A: Reroute [d]			On-site, Containment Cell	Yes	Yes	★★★	★★	★	11	★	**$ 17,300,000**	$ 16,300,000	$ 685,000	$ 336,000
		B: Work Around				Yes	Yes	★★	★	★★	8	★★	**$ 12,600,000**	$ 11,600,000	$ 685,000	$ 336,000
		C: Cap				Yes	Yes	★★★	★★	★★	8	★★	**$ 12,900,000**	$ 11,800,000	$ 727,000	$ 336,000
Excavation (surface only) and Capping Alternatives	SOIL-3-1	A: Reroute [d]	Excavation and backfill with clean soil (the clean soil functions as a cap for subsurface soil)		Off-site, RCRA Subtitle C Landfill	Yes	Yes	★★★	★★★	★★	8	★	**$ 36,800,000**	$ 36,700,000	$ 85,700	$ -
		B: Work Around				Yes	Yes	★★	★★	★★★	5	★★★	**$ 31,400,000**	$ 31,300,000	$ 85,700	$ -
		C: Cap				Yes	Yes	★★★	★★★	★★★	5	★★★	**$ 31,500,000**	$ 31,400,000	$ 127,000	$ -
	SOIL-3-2	A: Reroute [d]		S/S (in situ)	Off-site, RCRA Subtitle C Landfill	Yes	Yes	★★★	★★★	★★	6	★	**$ 40,600,000**	$ 40,400,000	$ 172,000	$ -
		B: Work Around				Yes	Yes	★★	★★	★★★	4	★★★	**$ 34,600,000**	$ 34,400,000	$ 172,000	$ -
		C: Cap				Yes	Yes	★★★	★★★	★★★	4	★★★	**$ 34,700,000**	$ 34,500,000	$ 213,000	$ -
	SOIL-3-3	A: Reroute [d]			On-site, Containment Cell	Yes	Yes	★★	★★	★★	8	★	**$ 9,270,000**	$ 8,190,000	$ 747,000	$ 336,000
		B: Work Around				Yes	Yes	★	★	★★★	5	★★	**$ 6,090,000**	$ 5,010,000	$ 747,000	$ 336,000
		C: Cap				Yes	Yes	★★	★★	★★★	5	★★	**$ 6,240,000**	$ 5,120,000	$ 788,000	$ 336,000
	SOIL-3-4	A: Reroute [d]		S/S (in-situ)	On-site, Containment Cell	Yes	Yes	★★	★★	★★	6	★	**$ 20,700,000**	$ 19,500,000	$ 833,000	$ 336,000
		B: Work Around				Yes	Yes	★	★	★★★	4	★★	**$ 15,500,000**	$ 14,300,000	$ 833,000	$ 336,000
		C: Cap				Yes	Yes	★★	★★	★★★	4	★★	**$ 15,600,000**	$ 14,400,000	$ 874,000	$ 336,000
Capping Alternatives	SOIL-4-1	A: Reroute [d]	Capping			Yes	Yes	★★	★★	★★★	5	★	**$ 4,310,000**	$ 4,220,000	$ 85,700	$ -
		B: Work Around				Yes	Yes	★	★	★★★★	3	★★	**$ 1,500,000**	$ 1,410,000	$ 85,700	$ -
		C: Cap				Yes	Yes	★★	★★	★★★★	3	★★	**$ 1,640,000**	$ 1,510,000	$ 126,900	$ -
	SOIL-4-2	A: Reroute [d]	Capping	S/S (in-situ)		Yes	Yes	★★	★★	★★★	9	★	**$ 19,000,000**	$ 18,800,000	$ 172,000	$ -
		B: Work Around				Yes	Yes	★	★	★★★★	6	★★	**$ 13,500,000**	$ 13,300,000	$ 172,000	$ -
		C: Cap				Yes	Yes	★★	★★	★★★★	6	★★	**$ 13,500,000**	$ 13,300,000	$ 213,000	$ -

Table 7 – Soil Alternatives – Comparison to National Contingency Plan Remedy Selection Criteria (Continued)

TABLE 7
COMPARATIVE EVALUATION OF SOIL ALTERNATIVES

	Remedy Components				**Threshold Criteria**		**Balancing Criteria** [a]								
		Primary Technologies (by media type)													
Alternatives	Pipeline Approach	Surface Soil	Subsurface Soil	Disposal	Overall protection of human health and the environment	Compliance with ARARs	Long-term effectiveness and permanence	Reduction in toxicity, mobility, or volume through treatment	Short-term effectiveness	Construction Time (months)	Implementability	**Total Cost [b][c] (present worth) =**	Capital cost +	Lifetime O&M cost + (present value)	Lifetime LTM cost (present value)

NOTE:

(a) The alternatives were assigned one of the following ratings for each balancing criteria, except cost:

★★★★ = Excellent performance against the criterion.

★★★ = Good performance against the criterion.

★★ = Fair performance against the criterion.

★ = Poor performance against the criterion.

(b) The expected accuracy of a Feasibility Study cost estimate is -30/+50 percent. Present value costs were calculated using a 7 percent discount rate and a 30 one-year payment periods.

(c) The total costs presented on this table do not include the capital costs to implement the Common Components (approximately $400,000).

(d) On this table, the capital costs and construction time to reroute the gas-pipeline were added to both soil AND sediment alternatives that include Approach A. However, if Approach A is part of the selected remedy, the costs and time should only be counted once for both media to avoid double counting. For reference, the cost and time to reroute the pipeline are approximately $2,000,000 and 2 months.

ARAR - applicable or relevant and appropriate requirement
LTM - long-term monitoring
NFA - no further action
O&M - operations and maintenance
RCRA - Resource Conservation and Recovery Act
S/S - solidification and stabilization
TBD - to be determined

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Chemical	U.S. Environmental Protection Agency (EPA). Regional Screening Levels for Chemicals at Superfund Sites. May 2018.	Establishes screening levels for chemical contaminants in soil, water, and air.	Soil at the site has concentrations of chemicals of concern (COCs) that pose a potential unacceptable risk to humans. The screening levels are to be considered (TBC) for these three media.	TBC
	Louisiana Department of Environmental Quality (LDEQ) Risk Evaluation / Corrective Action Program (RECAP; LDEQ 2003)	Establishes remediation standards for soil and groundwater in the State of Louisiana.	RECAP does not apply to sediment. For the soil cleanup values, there are no RECAP values for dioxin. For arsenic, the RECAP is based upon state background levels and is not site-specific. For PAHs (benzo(a)pyrene), the RECAP value is based upon a laboratory quantitation limit that is not risk-based. Therefore, RECAP is not applicable.	Does Not Apply
	Water Quality Standards (Clean Water Act): 40 Code of Federal Regulations (CFR) §131	Establishes concentration levels for in-stream chemical contaminants for the protection of human health, wildlife, and aquatic life.	Currently, surface water is not a media of concern. However, the water quality standards of the Clean Water Act are potentially applicable if future sampling indicates concentrations of COCs in surface water pose unacceptable risk to human or ecological receptors.	Potentially Applicable
	National Primary Drinking Water Regulations, Maximum Contaminant Levels (MCLs): 40 CFR §141 Subpart G	Establishes the maximum concentration of a contaminant in water delivered by public water systems.	COCs concentrations in soil exceed MCL-based soil protection of groundwater screening levels and the site overlies a sole-source drinking water aquifer. Therefore, MCLs are relevant and appropriate.	Relevant and Appropriate

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Location	Location Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities: 40 CFR §264.18	These regulations require that a facility must be designed and maintained to avoid washout if located within a 100-year floodplain.	Most of the site is within a 100-year floodplain. This regulation is relevant and appropriate if a landfill, or other containment structure, is built within the floodplain.	Relevant and Appropriate
	Floodplain Management: Executive Order 11988	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid adverse impacts in the floodplain.	Most of the site is within a 100-year floodplain. Remedial activities within the floodplain will be subject to this executive order.	TBC
	Wetland and Floodplain Protection: 44 CFR §9	Requires that any actions taken within wetlands or floodplains minimize damage to those features and that they preserve and enhance natural and beneficial wetland and floodplain values.	Most of the site is within a 100-year floodplain and there are wetland areas in portions of the site. Remedial activities within the floodplain and wetland areas will be subject to this regulation.	Applicable
	Wetland Protection: Executive Order No. 11990	Requires federal agencies to avoid construction in wetlands unless there is no practicable alternative. If construction is not avoidable, then actions must be taken to minimize damage to wetlands.	There are wetland areas at the site that may require removal of sediment and placement of fill during the implementation of a remedy.	TBC
	Wetland Protection: 40 CFR §230 - §232	Provides protection for wetlands from activities such as dredging and the placement of fill material.	There are wetland areas at the site that may require removal of sediment and placement of fill during the implementation of a remedy.	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Location	Migratory Bird Treaty Act (MBTA): 16 United States Code (USC) 703	Makes it illegal to pursue, take, kill, possess, buy and sell, among other similar activities, migratory birds, unless a permit is obtained. That includes the birds eggs, nests, and their parts. Protected migratory birds are listed in 50 CFR §10.13.	According to U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC), there are two migratory birds that occur on the USFWS Birds of Conservation Concern (BCC) list and may potentially be present at the site: lesser yellowlegs (Tringa flavipes) and gull-billed terns (Gelochelidon nilotica). Remedial construction is not expected to impact non-breeding birds. Lesser yellowlegs are not expected to breed at the site, but may be present at the site in early August. Gull-billed terns are expected to occur at the site by late April and the breeding season lasts from May through the end of July. The terns nest on the ground and the ideal nesting habitat is gravelly or sandy beaches (The Cornell Lab 2019), so nesting at the fresh-water swamp site may not be likely. In order to prevent impacts to nesting terns, nesting surveys will be performed prior to impacting habitat during the breeding season to confirm no presence of nesting birds or alternatively, habitat will not be impacted during the breeding season (May through July). The Cornell Lab. 2019. All About Birds. Gull-billed Tern Life History. https://www.allaboutbirds.org/guide/Gull-billed_Tern/lifehistory	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Location	Endangered Species Act of 1973: 16 USC Section §1531 et seq. and 50 CFR §17	Identifies species of wildlife and plants listed as endangered or threatened. Federal agencies must confirm any action that is federally authorized, funded, or implemented by the agency is not probable to adversely affect the continued existence of any threatened or endangered species. The agency must ensure that the critical habitat is not destroyed or negatively modified.	The Louisiana black bear (Ursus americanus luteolus) is a federal and state threatened species and is the only species listed as endangered or threatened expected to occur in Acadia Parish. Based on consultation with Louisiana Department of Wildlife and Fisheries (LDWF; 2016), no threatened or endangered species are expected to occur near the project area. Although we have not observed Louisiana black bear (Ursus americanus luteolus) at the site, if endangered or threatened wildlife or plants are identified adjacent to or at the site at any point, then this requirement will apply.	TBC
	Louisiana Natural Heritage, Threatened and Endangered Species: Louisiana Administrative Code (LAC) 76:I.317	Identifies those species of wildlife and plants listed as endangered or threatened by the State of Louisiana.	The Louisiana black bear (Ursus americanus luteolus) is a federal and state threatened species and is the only species listed as endangered or threatened expected to occur in Acadia Parish. If endangered or threatened wildlife or plants are identified adjacent to or at the site at any point, then this requirement will apply.	TBC
	Fish and Wildlife Coordination Act: 16 USC §661-667e	Requires adequate provisions for protection of fish and wildlife resources.	Remedial activities performed near the bayou will need to protect fish and wildlife resources.	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	*Air Emissions*			
	Control Facilities to be Installed When Feasible: LAC 33:III.905	States air pollution control facilities should be installed whenever practically, economically, and technically feasible even though the ambient air quality standards in the affected area are not exceeded.	Applicable to remedies that require the use of equipment on-site that will emit air pollutants (e.g., on-site treament remedies such as thermal desorption and solidification/stabilization).	Applicable
	Air Emission Standards for Process Vents: 40 CFR §264 Subpart AA	Establishes standards to control organic air emissions from hazardous wastes that are released from process vents at hazardous waste Treatment, Storage, and Disposal Facilities (TSDFs) that use certain processes (e.g., distillation, solvent extraction, air stripping).	These regulations are relevant and appropriate for remedies that will treat contaminants on-site with technologies (e.g., thermal desorption or chemical oxidation) that will have process vents and may have organic air emissions.	Relevant and Appropriate
	Air Emission Standards for Equipment Leaks: 40 CFR §264 Subpart BB	Establishes standards to control organic air emissions from hazardous wastes that may leak from equipment at hazardous waste TSDFs and have concentrations of organics at 10 percent, or greater, weight.	These regulations are relevant and appropriate for remedies that will treat contaminants on-site with technologies (e.g., thermal desorption or chemical oxidation) that will use equipment with the potential to leak organic air emissions (e.g., pumps and valves).	Relevant and Appropriate
	Control of Fugitive Emissions: 40 CFR §63 Subpart GGGGG	Describes precautions that must be taken to prevent particulate matter from becoming airborne.	Applicable to remedies that will generate airborne particulate matter during implementation (e.g., remedies with earthwork components).	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	*Containment Cell*			
	Code of Ordinances, Parish of Acadia, Chapter 8, Article 6, Sections 8.89(3)	Prohibits the placement of a waste disposal facility for controlled industrial waste within three miles of an inhabited residence, hospital, or school. Waste disposal facilities include sites or property used to dump, leave, store, incinerate, or deposit controlled industrial waste.	This ordinance is to be considered for remedies that include the construction of an on-site containment cell and on-site thermal desorption.	TBC
	Landfill Construction Requirements 40 CFR 264.301	Describes the design and operating requirements applicable to facilities that dispose of hazardous waste in landfills.	These regulations apply to landfills that manage hazardous waste. They are considered relevant and appropriate for similar facilities (e.g., containment cells).	Relevant and Appropriate
	Groundwater Protection: 40 CFR §264.97	Describes the groundwater monitoring requirements applicable to owners or operators of facilities that treat, store or dispose of hazardous wastes.	These regulations apply to facilities that manage hazardous waste. They are considered relevant and appropriate for similar facilities (e.g., containment cells).	Relevant and Appropriate

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	Closure and Post-Closure: 40 CFR §264 Subpart G	Describes the closure and post-closure requirements applicable to hazardous waste disposal facilities and other facilities described in 40 CFR §264.110.	These regulations apply to facilities that manage hazardous waste. They are considered relevant and appropriate for similar facilities (e.g., containment cells).	Relevant and Appropriate
Action	*Monitoring Wells*			
	Monitoring Well Construction: LAC 56: I Chapter 3	Provides construction standards for monitoring well installation.	The substantative requirements of this regulation, not the permit requirements, are applicable to remedies that require the installation of monitoring wells.	Applicable
	Monitoring Well Abandonment: LAC 56: I Chapter 5	Provides standards for the proper plugging and abandonment of existing wells.	The substantative requirements of this regulation, not the permit requirements, are applicable to remedies that require the abandonment of existing monitoring wells.	Applicable
Action	*Safety*			
	Worker Health and Safety For Remedial Action: 40 CFR §300.150 and 29 CFR §1910.120	Establishes safety and health requirements that apply to workers at Superfund sites.	Applicable to remedies that may expose workers to safety or health hazards during remedial activities.	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	*Waste Disposal*			
	Identification of Hazardous Waste: 40 CFR §261 Subparts A through D and LAC 33:V §1103	Establishes the procedures for determining if a waste is classified as hazardous.	Applicable to remedies that require off-site disposal of waste (e.g., excavated soil or sediment).	Applicable
	Land Disposal Restrictions: 40 CFR §268	Restricts the land disposal of most hazardous wastes, and establishes specific treatment standards that must be met before these wastes can be land disposed.	Applicable to remedies that require off-site disposal of hazardous waste.	Applicable
	Criteria for Hazardous Waste Being Managed Within an Area of Contamination (AOC): LAC 33: V Chapter 1, §105(P)	Defines AOCs and states the requirements for and limitations of AOCs.	Applicable to remedies that will consolidate waste in an on-site containment cell. The area the waste originates from and the location of the containment cell will need to be designated as a single, contiguous, AOC.	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	*Waste Disposal*			
	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Requirements for Remediation Waste Management Sites: LAC 33:V §1501(H)	Establishes requirements for owners or operators of remediation waste management sites. Remediation waste management sites are sites that will be treating, storing, or disposing of hazardous remediation wastes.	Applicable to remedies that will treat hazardous waste on-site.	Applicable
	Staging Piles: 40 CFR §264.554	Describes the operating requirements for the use of staging piles to store hazardous remediation waste during remedial activities.	Applicable to remedies that will need to temporarily store hazardous remediation waste on-site during remedy implementation.	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	*Waste Disposal*			
	Miscellaneous Units: 40 CFR §264, Subpart X	Describes the requirements applicable to owners or operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units. A miscellaneous unit is a hazardous waste management unit that is not a container, tank, surface impoundment, pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, underground injection well, containment building, corrective action management unit, unit eligible for a permit under 40 CFR §270.65, or a staging pile.	Applicable to remedies that will treat hazardous waste in a thermal desorption unit on-site. Thermal desorption units were assumed to be considered miscellaneous units, rather than incinerators, for the purposes of the feasibility study.	Applicable
	Standards Applicable to Generators of Hazardous Waste: LAC 33:V Chapter 11	Provides requirements for preparation of waste manifests, waste packaging, labeling and handling.	Applicable to remedies that require off-site disposal of hazardous waste.	Applicable
	Standards Applicable to Transporters of Hazardous Waste: 40 CFR §263	Requires that hazardous material to be transported off site be labeled and placarded according to the regulations and that contractors who transport the hazardous waste provide proper documentation.	Applicable to remedies that require off-site disposal of hazardous waste.	Applicable

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement
Action	*Waste Disposal*			
	Petitions to exclude (i.e., delist) a waste produced at a particular facility: 40 CFR §260.22 and LAC 33:V §105(M)	Describes the requirements for submitting a petition to delist a waste that carries hazardous waste codes from the F, K, P, or U lists.	Applicable to remedies that will treat listed hazardous waste on-site to below the Land Disposal Restriction treatment standards and will seek delistment in order to dispose of the treated waste in a nonhazardous waste landfill.	Applicable
Action	*Water Discharge*			
	Louisiana Pollutant Discharge Elimination System (LPDES) Program: 40 CFR §122 and LAC 33:IX Subpart 2	Regulates water pollution from point sources that discharge pollutants to waters of the State of Louisiana.	The LPDES program covers stormwater discharges from construction sites and, therefore, this regulation is generally applicable to all remedies with a substantial construction component.	Applicable
	Wetland Protection (Section 404 Program): 40 CFR §230 through §232	Provides protection for wetlands from activities such as dredging and the placement of fill material. Requires mitigation measures if such activities are to take place.	These regulations are applicable to remedies that require the placement of fill in wetlands (e.g., to build a construction road).	Applicable
Action	*Underground Storage Tanks*			
	Out-of-Service Underground Storage Tanks (UST) Systems and Closure: LAC 33:XI Chapter 9	Describes the requirements to temporarily or permanently close USTs.	There is a UST and an underground oil-water separator that will need to be removed from the site. This regulation is applicable to the UST and relevant and appropriate to the oil-water separator.	Applicable and Relevant and Appropriate

TABLE 8
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED ITEMS

Type	Regulation and Citation	Description	Rationale for Use	Type of Requirement

Note:
AOC - Area of Contamination
CFR - Code of Federal Regulations
COC - Chemical of Concern
EPA - United States Environmental Protection Agency
LAC - Louisiana Administrative Code
LDEQ - Louisiana Department of Environmental Quality
MBTA - Migratory Bird Treaty Act
MCL - Maximum Contaminant Level
LPDES - Louisiana Pollutant Discharge Elimination System
LDWF - Louisiana Department of Wildlife and Fisheries
RECAP - Risk Evaluation / Corrective Action Program
TBC - To be considered
TSDF - Treatment, Storage, and Disposal Facility
USC - United States Code
UST - Underground Storage Tank